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THE UNIVERSITY OF ALBERTA

FIELD DEPENDENCE AND FAMILIAL RETARDATION

BY

© WAYNE CHRISTIE NESBIT

A THESIS
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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "Field Dependence and Familial Retardation" submitted by Wayne Christie Nesbit in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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Dedication

To Dr. Juanita Chambers

Not simply intellect ... a number of qualities which in combination might most appropriately be labelled character

ABSTRACT

Essentially two research interests guided this investigation -- (1) the cognitive functioning of the familial retardate and (2) the psychological development of the retarded child as it relates to Witkin's differentiation hypothesis.

Thirty-four retarded children (having IQ's in the 50 to 70 range, and displaying no signs of organicity) were compared with a group of 34 nonretarded children in terms of measures related to Witkin's cognitive style construct. The groups were matched on mental age (MA = 107 mos.).

The Witkin measures were chosen as an avenue of investigation because they facilitated examination of familial retardation at various levels. The measures were considered (1) as measures of spatial ability, (2) as measures of a pervasive cognitive style construct ranging from global to analytical and (3) at an inferential level, as indicators of psychological development in a holistic sense as envisaged in Witkin's differentiation hypothesis.

The study reconsidered Zigler's "two-group" approach to mental retardation and "developmental model of cognitive growth" which generates the expectation that no appreciable differences (other than motivational) should be observed when MA matched familial retardates and nonretarded individuals are confronted with the same cognitive task(s). This position has been described by Zigler as a "developmental" theory of retardation, in contrast to numerous other orientations which he has labelled "defect" positions.

In this study, the retarded children achieved lower scores than the MA matched nonretarded children on each of three measures -- the Rod and Frame Test, the Children's Embedded Figure Test, and Raven's Coloured Progressive Matrices. Considering the tests as independent measures of spatial ability, a one-way analysis of variance was carried out on the performance of the MA matched groups on each measure. In each case a difference at the .0001 level of significance was observed. In a two-way analysis of variance (considering the measures as repeated measures of field-dependence), a significant main effect ($p < .0001$) was observed between the groups. No significant main effect was observed across treatments and no interactions were identified.

The results did not support Zigler's basic assumption with regard to MA matched groups. During sample selection and the testing phase of the research, a careful attempt was made to minimize gross motivational differences between the groups. Consequently, explanation of the results in terms of motivational or non-cognitive factors did not seem viable.

Two positions or lines of reasoning presented reasonable possibilities vis-à-vis explanation of results. The first position purported that between group differences observed in research employing an MA match paradigm are an artifact of the research design. That is, MA matching accounts for level of cognitive development but makes no provision for cognitive factors underlying the rate of cognitive development (represented in IQ).

Another line of reasoning (not regarded as antithetical to the first) merited credibility with regard to the research results. It seemed plausible that the familial retardates employed a mode of cognitive processing which was different from that employed by the MA matched nonretarded children. In effect, the retarded children displayed a global, field-dependent style in contrast to the nonretarded children who were characterized by a more analytical, field-independent style.

At an inferential level, the results were considered in terms of Witkin's differentiation hypothesis as it relates field-dependency to diverse facets of psychological development associated with body concept, experience of self, and experience of the external environment.

The results did not reflect unfavourably upon Zigler's dichotomy of the macro retardate population, nor did they of necessity imply some type of cognitive defect. However, the cognitive style differences which were indicated stand in deference to Zigler's developmental model of cognitive growth and its inherent assumption concerning MA matched retarded and nonretarded groups.

Accordingly, it was concluded that the familial retardate should not be considered solely in terms of mental age level. Educational expectations fashioned on such a basis were deemed insensitive to the possibility of cognitive and personal differences distinguishing the familial retardate from the MA matched nonretarded child.

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To the children

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CHAPTER I

MENTAL RETARDATION -- DISPARATE THEORETICAL ORIENTATIONS

Research in mental retardation represents a mélange of theoretical orientations which define retardation in terms of diverse social, medical, educational, and learning models. Before presenting the research question which was the focus of this study, it is imperative to make a cursory review of the concepts in mental retardation which are relevant to it. A historical overview of concept development will be presented, followed by a review of the major theoretical positions which have emerged from research in mental retardation.

HISTORICAL OVERVIEW

J. Clausen (1967), in a review of conceptual changes in the field of mental retardation, noted that the term "idiocy" (which retained popular usage into the present century) is a derivative of a Greek word denoting persons who could not take part in public life. It must be noted however that only the most severe forms of deficiency were recognized during the pre-Renaissance period and that societal reaction to the presence of such persons represented a wide spectrum of behavior.

Generally speaking, during early times little attempt was made to differentiate between various forms of deficiency or to classify various etiologies. Before the advent of social, cultural, and psychometric considerations in the field of mental retardation, most attempts at definitions were in terms of physiology.

One of the first controversies concerning the nature of retardation arose toward the end of the eighteenth century when Itard was given custody of a twelve year old feral boy. Itard, inspired by the philosophy of sensationalism and humanism, attempted to improve the boy's functioning by means of education and experience. The boy, who at the commencement of the experiment was functioning at a primitive level, was rigorously trained for five years. Itard labelled the boy's condition "dementia" believing that the boy could be helped despite his present level of functioning. This Itard proposed to do through an intensive program of stimulation through the senses.

Itard's chief opposition came from Pinel who had diagnosed the boy's condition as "amentia" -- being without the necessary attributes. In Pinel's nativistic point of view the training programs proposed by Itard were useless and without hope of success. Itard did however achieve limited success in his efforts to train the boy.

At such an early time in the history of retardation research the controversy concerning nativistic and environmental influences had made its appearance. This issue has pervaded time and is currently of concern to numerous researchers whose views shall be presented.

Despite this early attempt to differentiate between endogenous and exogenous factors in retardation, most attempts at definition during the nineteenth and early twentieth century were of a biological nature.

In 1860 Duncan displayed a biological preference in his definition of the "simpleton", a term which he introduced. He used this term to describe those who had "nearly all the faculties to a certain degree, but indicate their alliance to the true idiot by their physiological deficiencies and general inertia of mind (cited in Penrose, 1949, p. 6)". A proponderance of physiologically based definitions of retardation are to be found in the history of research in mental retardation during this period.

Again, Seguin (1866) defined idiocy as "a specific infirmity of the cranio-spinal axis, produced by deficiency of nutrition in utero or in neo-nati (p. 39)". Another such definition of retardation was presented by Ireland (1900) in a comprehensive textbook on mental deficiency. Ireland framed his definition in terms of "malnutrition or disease of the nervous centres, occuring either before birth or before the evolution of the mental facilities in childhood (p. 1)".

Although Ireland's definition had its roots in organicity, he did expand the concept of retardation by the inclusion of a behavioral dimension. He viewed deficiency as the behavioral manifestation of organic impairment, thus including social adequacy considerations in the concept of mental retardation.

Tredgold, in the first edition of Mental Deficiency (1908) defined mental deficiency in terms of incomplete cerebral development. Although his orientation was biological he included the behavioral consequences of organic impairment on social adaptability as a criterion for mental deficiency as had Ireland.

The early part of the twentieth century saw the expansion of the concept of mental deficiency and numerous conflicting definitions. Many authors subsequent to Ireland and Tredgold (Goddard, 1914; Penrose, 1949; Wallin, 1949; and Doll, 1942) began to advocate multiple criteria for the definition of mental deficiency rather than a single physiological factor. Penrose (1949) continued to demonstrate a strong preference for the traditional biological criterion for the definition of mental deficiency. Nevertheless, he did concede that some value must be credited to social adaptation and level of intelligence as supplementary criteria.

Although it was historically characteristic to view mental retardation as the result of organic factors, the definition has been confounded during the last few decades by numerous social and intellectual considerations which have been introduced. It became common during the early part of the twentieth century to refer to those whose retardation was the obvious result of physiological defects as "clinical types". Later in the century, with the ascendancy of social and cultural factors in retardation theory, the "familial" retardate became a common term to describe those whose retardation was assigned to such factors.

Commencing with the work of Binet and Simon (1907) psychometric definitions of mental retardation came to the foreground. Although much criticism was leveled against psychometric definitions of retardation by members of the physiological school of thought, the work of Binet and Simon was not to be discredited. The unrefined tests which had attracted both interest and criticism were acclaimed by Hollingworth (1926) and Wechsler as great achievements. Wechsler (1958) stated that "the definition of mental deficiency in terms of attained mental age (MA) or intelligence quotient (IQ) represented a marked step forward (p. 49)".

The recognition of cultural and social factors in mental deficiency did much to modify the original concept. One of the strongest voices supporting the inclusion of cultural and social factors in the definition of mental retardation has been that of Sarason (1959) who, on considering the advances of psychometric testing, noted that the relation between test scores and cultural background is often overlooked. Boring (1965) has also made strong reference to external factors and influences which might be responsible for subnormal functioning as indicated by test results. Consideration of such factors has brought about current definitions of retardation which segment the retardate population as to source of retardation.

DEVELOPMENTAL POSITION

One of the most emphatic attempts to dichotomize the retardate population has been that of Edward Zigler (1967a, 1967b). His position with regard to mental retardation has been labelled the "two-group approach". Zigler based his dichotomy on a distinction between those having known physiological defects responsible for their retardation, and those who on examination reveal none of the physiological syndromes commonly associated with retardation. It is this second and much larger group which Zigler has labelled "familial retardates".

Zigler based his definition of the familial retardate on a polygenic model of intelligence. In terms of such a model, intelligence is not viewed as being dependent upon a single gene but as the aggregate of a number of discrete genetic units.

In view of this model, Zigler stated that the existence of the familial retardate at the lower end of the Gaussian distribution may be accounted for in the same manner as the presence of the intellectually gifted at the upper end of the distribution. Zigler asserted that the familial retardate may be viewed as normal where "normal" is defined as meaning an integral part of the intelligence distribution which would be expected in the genetic pool of the general population. He thus adopted the position that the familial retardate is not organically impaired or pathological; he is essentially a normal individual of low intelligence. The cognitive development of the familial retardate, according to Zigler, differs from that of the normal person only with respect to the rate of development and the upper limit achieved.

The other group of retardates (having known physiological defects) represents a distinct entity in Zigler's definition. Their etiologies and subnormal functioning represents factors other than normal polygenic expression. This dichotomy represents the basis of Zigler's "two group approach" to retardation.

According to Zigler the normal distribution of intelligence is depicted as having a mean of 100, with lower and upper limits approximately 50 and 150 respectively. Superimposed upon this curve Zigler represented the organic retardates as a second distribution with a mean of approximately 35 and a range from 0 to 70. Figure 1 illustrates Zigler's model.

There is a general consensus among retardation theorists that mental retardates below 50 IQ are organically impaired or, for the most part, are the result of physiological defects. Although there are numerous theoretical positions concerning the actual defects of the primary retardates, it is concerning the group of retardates having IQ's from 50 to 70 that the major controversy has arisen.

Zigler, being the proponent of a two-group approach to retardation, has taken exception to the homogeneous classification of all persons having IQ's between 0 and 70 as "different" or "defective". Zigler (1967b) asserted that 75% of all retardates, upon clinical examination, reveal none of the common physiological manifestations of retardation and therefore should not be considered defective or pathological but as normal individuals of low intelligence.

Accordingly, Zigler has taken the position that his approach is "developmental" in contrast to numerous other research approaches which he has labelled "defect" positions. A developmental model of cognitive growth presented by Zigler (1969) in an attempt to clarify his position vis-à-vis familial retardation is presented in Figure 2. Zigler qualified his position in terms of the model as follows:

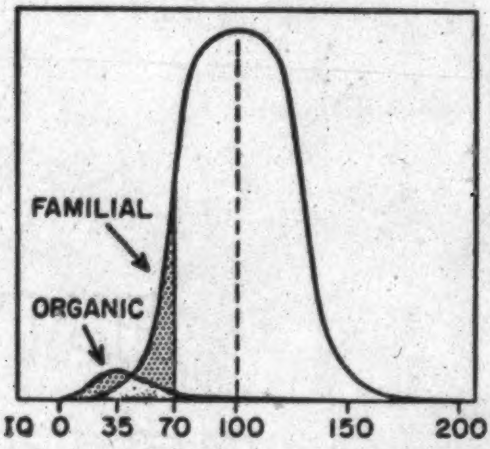

Fig. 1. Distribution of intelligence as represented in the two-group approach (Zigler, 1969, p. 554)

> According to this model, the cognitive performance of individuals of differing IQs who are at the same cognitive level and, therefore, at different chronological ages, should behave exactly the same on cognitive tasks (p. 540).

Within Zigler's framework cognitive performance is regarded as a function of individual cognitive level, regardless of the amount of time it took the individual to reach that level.

Zigler, whose view of retardation is not without support (Lewis, 1933; Roberts, 1952; Penrose, 1963), stated that a motivational factor rather than a cognitive factor is at the root of inferior task performance of familial retardates matched on MA with nonretarded subjects. High negative reactive tendencies, anticipated failure, outer-directedness, and lack of self reinforcement are considered responsible for the retardates' shortcomings rather than some type of cognitive defect.

Other researchers besides Zigler have dichotomized the general population of retardates in terms of (a) primary retardates -- those having identifiable physiological defects, and (b) cultural - familial or secondary retardates -- those representing the lower end of the normal polygenic distribution of intelligence.

Jensen (1970) stated that the macro retardate population must not be envisaged as a homogeneous grouping. An attempt to do so, according to Jensen, would be erroneous in light of the natural dichotomy which presents itself. The two basic categories or divisions were labelled "primary" and "secondary".

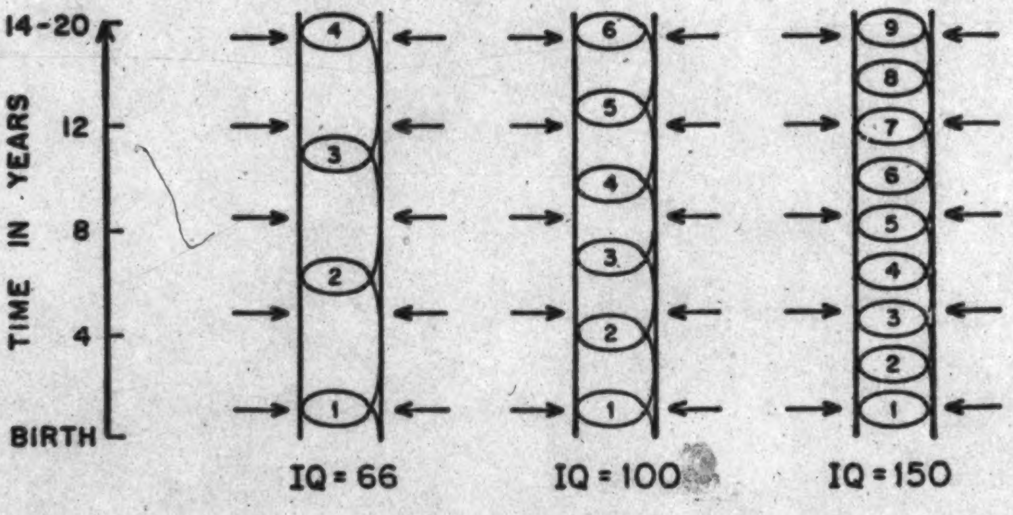
14-20
12
8
4
BIRTH
TIME IN YEARS
1
2
3
4
5
6
7
8
9
IQ = 66
IQ = 100
IQ = 150

Fig. 2. Developmental model of cognitive growth. The single vertical arrow represents the passage of time. The horizontal arrows represent environmental events impinging on the individual who is represented as a pair of vertical lines. The individual's cognitive development appears as an internal ascending spiral, in which the numbered loops represent successive stages of cognitive growth (Zigler, 1969, p. 538).

Jensen described the primary retarded group as being composed of mental defectives manifesting physical abnormalities indicative of neurological damage, a single mutant gene, or a chromosomal defect such as those associated with the common trisomy syndromes. This group, stated Jensen, "stands apart from the normal distribution of mental abilities in the general population (p. 34)". Thus the excess bulge at the lower end of the normal intelligence distribution would represent the primary retardates whose physiological etiologies would negate any attempt to view them solely in terms of normal polygenic determinants of intelligence.

Jensen (1970) described "primary" retardates as being, for the most part, below 50 IQ and having physical abnormalities or clear signs of neurological damage. With regard to those in the IQ range from 50 to 70, Jensen expressed the view that 75% of these individuals appear clinically normal without signs of neurological damage, sensory defects, or anomolies. This group, commonly referred to as secondary or cultural-familial retardates, is representative of the bottom 2 to 3%, or the lower end, of the normal distribution; accordingly, the other 25% of the 50 to 70 IQ range thus represents the upward limits of the group which he earlier described as primary or organically-based retardates. There is a cross-over or overlap between the upper limits of the primary retardate group and the lower limits of the cultural-familial group.

The secondary retardate population is thus described by Jensen as consisting of normal people who as a result of poor genetic endowment occupy a position at the lower end of the normal distribution of intelligence. The dichotomy made by Jensen aligns itself with that envisaged by Zigler in his two-group approach to mental retardation.

DEFECT POSITIONS

Zigler has stated that numerous researchers and theorists are in opposition to his dichotomized approach to mental retardation. He has described this group as representing diverse hypotheses as to the causative factors in retardation, the main point of commonality being the premise that all retardates suffer from some type of defect either physically manifested or covert. Despite their disparate theoretical viewpoints, Zigler (1967a, 1967b, 1969) referred to this group (Lewin, 1935; Kounin, 1941a, 1941b; Goldstein, 1942; O'Connor and Hermelin, 1959; Siegal and Foshee, 1960; Ellis, 1963; Luria, 1963; Spitz, 1963; Zeaman and House, 1963) as defect theorists.

Cognitive Rigidity -- K. Lewin and J. Kounin

One of the earliest defect positions in mental retardation theory resulted from the research of Lewin (1935) and Kounin (1941a, 1941b). The Lewin-Kounin orientation to retardation has its roots in Lewin's topological field theory which views behavior as the resultant of forces functioning in and relating to personal and environmental structures. Within this framework of vector psychology, each individual has a personal "psychical system" which is differentiated to a greater or less degree into regions or "cells" which interact with each other and with the environment in an idiosyncratic fashion.

Salient to the Lewin-Kounin stance regarding mental retardation is the concept of "rigidity" which, in Lewin's original topological theory, was described as "the closeness of the functional relationship between cells of the person (Kounin, 1941a, p. 251)". In comparative studies of "feeble-minded" and nonretarded subjects Lewin (1935) demonstrated that retarded subjects behave in a much more rigid fashion than nonretarded subjects and concluded that their behavior reflects relatively high impermeability of boundaries between the cells of the cognitive structure.

Kounin (1941a, 1941b) extended the work of Lewin attempting to determine whether differences between familial retardates and nonretarded subjects were of a quantitative or qualitative nature. Employing Lewin's concept of rigidity as being a lowered capacity for reorganization of the psychical system, Kounin conducted a number of studies comparing the behavior of retardates and nonretardates with regard to the process of satiation and co-satiation, the transfer of habit, performance in overlapping situations, and the integration and restructuring of classifications. Kounin considered his results to be supportive of the hypothesis that "rigidity is a positive monotonous function of the degree of feeble-mindedness (1941a, p. 254)".

An analysis of the performance of retarded and nonretarded samples matched on MA led Kounin (1941a, pp. 270-271) to conclude that the more retarded an individual is:

1. The less effect a change of state in one region

will have upon the state of neighboring regions.

2. The less likely he is to be in an overlapping situation.
3. The more difficulty he will have in the performance of a task which requires him to be influenced by more than one region.
4. The less likely he is to structure a new field which is perceptually ambiguous into a relatively large number of independent regions (achieve a less integrated structure).
5. The less easily he can perform a task which requires that he restructure a given field.

The Lewin-Kounin theory of mental retardation has as its focal point the concept of rigidity -- the principle difference or defect which prevents the retardate from integrating the occurrences which take place in the various regions of his psychical system. Kounin (1941b) noted that a logical implication of the rigidity theory is that "regions in the psychological environment are independent from each other corresponding to the degree of rigidity of the person (p. 278)".

The slower rate of mental growth in retarded individuals (even after MA matching) is explained in terms of rigidity theory along three lines of reasoning -- (1) assuming mental growth involves change, rigidity makes the occurrence of change more difficult, (2) assuming that environmental factors play a role in mental growth, the same situation is less stimulating for the feeble-minded individual who, unlike the nonretarded individual, is rarely influenced simultaneously by more than one set of environmental regions, and (3) assuming that integration and restructuring play a role in mental growth, the retardate is less readily able to reconstruct a given field and attain integrated, unified structures.

Zigler (1969) gave support to Kounin's view of development as well as to his use of MA matching to equate retarded and nonretarded subjects in terms of general cognitive level. It was with the cognitive rigidity factor of the Lewin-Kounin research that Zigler took issue and labelled their theory a defect theory. According to Zigler, the hypothetical defect in cognitive structure which is the basis of rigidity theory has no specifiable physiological reference point. Zigler reasoned that the behavioral differences noted in Kounin's research (1941a, 1941b) might be explained with more justification in terms of a motivational factor.

Primary and Secondary Rigidity -- K. Goldstein

Goldstein (1942), prompted by the Lewin-Kounin research, formulated a somewhat similar theory of mental retardation having as its salient feature the concept of rigidity. Goldstein however dichotomized rigidity into primary and secondary rigidity. Primary rigidity was defined in terms of lesions in the subcortial ganglia while secondary rigidity was defined as a result of cortical damage or malformation. Zigler spent little time discussing this position viewing it in much the same manner as the Lewin-Kounin theory of cognitive rigidity.

Malfunctioning Disinhibitory Mechanisms -- P.S. Siegel and J.G. Foshee

In a study of response variability, Seigel and Foshee (1960) compared the response pattern variability of "mental defectives" and "normals" in an experimental situation which required that subjects choose one of four buttons to turn off a light. Choices required approximately equal effort and accomplished the common end. Subjects were instructed to use "any" button. The response patterns of the retardates demonstrated significantly less variability over 33 trials than did the patterns of the nonretarded group.

Relating to the work of Lewin (1935) and Kounin (1941a, 1941b), Seigel and Foshee presented an alternative explanation to account for the "rigidity" of the retardates' behavior. The results were considered in terms of stimulus satiation as defined by learning theory -- the inhibitory state which follows the presentation of a stimulus. It was reasoned that the lowered variability of the retardates resulted from a more pronounced disruption of inhibition arising out of a lessened capacity to exclude minor distractions. That is, disinhibition or distractibility underlies the rigid perseverative behavior of retardates.

Zigler (1967a) classified this position as a defect position taking into account the mean mental age of the nonretarded sample (8 yrs.-8 mos.) as compared to that of the retarded sample (6 yrs.-7 mos.) composed of both familial and organic retardates.

Stimulus Trace and Rehearsal Strategy -- N.R. Ellis

The stimulus trace theory of mental retardation proposed by Ellis (1963) in the Handbook of Mental Deficiency received strong criticism from Zigler who interpreted it as a homogeneous treatment of retardates as a group having a specifiable cognitive defect.

Ellis (1969) took strong issue with Zigler's interpretation of the defect orientation toward mental retardation while at the same time maintaining that retardates "have defective behavior when compared to others of similar chronological age living in their culture (p. 2)".

Ellis (1963) based his stimulus trace theory of retardation on the work of C. Hull (1952) who had hypothesized that when a cue and a stimulus are tenuously connected, a stimulus trace is left on the cortex and that this trace fades as a function of time. On a series of tests Ellis found retardates to be defective in short term memory and immediate recall. Relating to the work of Hull, Ellis hypothesized that retardates are defective in stimulus trace, i.e. an inadequate trace being left on the cortex. Ellis then offered a definition of retardation in terms of neural integrity.

Ellis (1970) in reviewing his 1963 research and the resulting theory states that:

> The concept of stimulus trace was that essentially proposed by Hull (1952). From this premise, it could be predicted that when the performance of retardates and normals was compared on some task which depended upon bridging a temporal gap the retardates' behavior would suffer in comparison. Moreover, when the magnitude of temporal separation between events increased the retardates' performance would deteriorate even more (p. 2).

In sequential experimental studies it was demonstrated that under conditions of instruction retardates can remember. In light of these findings Ellis found it necessary to revise his stimulus trace theory of retardation. Not rejecting his belief that the retardate has a loosely integrated cortex, Ellis began to consider other aspects of learning as possible sources of defect in the retardate.

Of the many memory models in existence, Ellis found that the model of Atkinson and Shiffrin (1965) provided many interesting cues for further research in mental retardation. The aspects of this model dealing with the relationship between memory and rehearsal strategies were of particular interest, and the model became the progenitor of Ellis' own memory model.

Ellis and Hope (1968) found in a series of three studies that in the retention of supraspan information (a series of nine randomly selected digits) "normals" and retardates demonstrated two memory processes - short term and long term. In 1970 Ellis attempted to further explore memory processes in retarded and "normal" subjects by use of a probe digit model similar to that which had been used in earlier studies. It was from this series of studies that Ellis derived his memory model and his definition of retardation in terms of poor rehearsal strategies.

Ellis drew the conclusion that "the retardate's deficiency is due to a failure of the rehearsal mechanism(s) (1970, p. 29)". This view of intellectual subfunctioning as being the result of a specific cognitive deficiency occasioned Zigler's criticism of the theory as a defect orientation.

Verbal Inertia -- A.R. Luria

Luria, a Soviet psychologist, has fashioned a definition of mental retardation which is representative of the Moscow School of Defectology. According to this position mental retardation is result of damage to the central nervous system during the intrauterine period or during early childhood. All grades of retardates (those with known etiology and those of unknown etiology) are believed to suffer from underlying neuro-physiological defects. In attempting to locate the "underlying initial defect" Luria and his co-researchers (1963) investigated the cognitive processes of retarded children in comparison to nonretarded children.

Luria noted that the behavior of the retarded child resembles that of chronologically younger children in that verbal instructions do not assume a regulatory function with regard to motor behavior. Luria also discovered that retardates have more difficulty on tasks requiring verbal mediation, again reflecting a disturbance in normal cortical activity.

The dissociation of speech and motor reactions or "dissociation of the two signalling systems" was interpreted by Luria as indicative of under-development or a general "inertia" of the verbal system. This derangement of the verbal system, according to Luria, disturbs not only the regulatory function of speech over motor processes but also highly complex nervous system functioning. This disorientation was described by Luria as the major defect in retarded children.

Luria strongly contested the possibility that familial retardation might account for some portion of the large general retardate population.

> The assertion of some authors that a considerable part of the population is hereditarily "subnormal", or exhibits traits of "constitutional psychopathy", can be hardly regarded as a worthy contribution to science (p. 369).

Zigler (1967a, 1967b) defined Luria's position as a defect position with reference to Luria's statement that the task of researchers in mental retardation is to "learn to qualify the basic defect and still more to approximate to the analysis of its underlying mechanisms (p. 362)". With regard to Luria's view of familial retardation, Zigler (1968) rebutted that the Soviet orientation to retardation (the specification of a neuro-physiological defect in all retardates) is an artifact of the Soviet political philosophy in which "workers in the area of mental retardation have no alternative but to accept a defect position (p. 235)".

Verbal Mediation -- N. O'Connor and B. Hermelin

O'Connor and Hermelin (1959), following Luria's theoretical lead, conducted research to investigate the use of verbal mediation in retardates. Their research was comprised of two experimental studies comparing MA matched retardates and nonretarded subjects on learning and discrimination reversal tasks involving size discrimination.

In the first experimental situation, no significant difference was found between the retardates and the nonretarded individuals in the number of trials required to learn the size discrimination. The "crucial difference" between the two groups appeared in the reversal phase of the experiment. The retardates required less than one third of the number of trials for reversal as compared to the original discrimination learning, while the nonretarded sample required nearly the same number of trials for reversal as for the original discrimination learning.

It was the view of O'Connor and Hermelin that the non-retarded children tended to formulate the solution to the original problem verbally. In the reversal task, the verbal self-instruction from the original learning came into conflict with new reinforcement consequently interfering with the solution of the new task. The retardate, having to unlearn only a motor response, found the reversal problem much easier. These findings tended to support Luria's view that retardates tend not to employ verbal mediators.

In the second experiment retardates were forced to make a verbal response before each response on the original size discrimination learning task. As predicted, the retardates took longer to learn reversal than did the retardates in the first situation. O'Conner and Hermelin considered this to be indicative that retardates are hampered in their performance by the increased use of verbal cues as a regulatory mechanism for motor responses.

It was concluded that "imbeciles, as long as they are not verbally reinforced, learn a perceptual motor habit, whereas the normals acquire two habits, one perceptual motor and one verbal (1959, p. 412)".

Although O'Connor and Hermelin felt that their results from the second experiment offered strong support for Luria's position, Zigler (1967a) questioned whether the performance of the retardates in the second experimental situation (in which no control group was included) might be attributed as much to changes in the experimental procedures as to the increased use of verbal cues.

Cortical Satiation -- H.H. Spitz

Spitz's theoretical stance *vis-à-vis* mental retardation has been categorized by Zigler (1967a, 1967b, 1969) as a defect position. Spitz (1963), in an attempt to operationally define mental retardation, expressed the view that all persons having an IQ under 70 are brain damaged in one way or another. Brain damaged was defined as "a deficit or defect in the structure and/or functioning of the organism's brain mechanisms which has resulted in a lowering of IQ (p. 12)". Again, in answer to the question as to why retardates are treated differently, Spitz stated that "quite obviously it is because, in most cases, they are different. They are less capable of displaying intelligent behavior than are normals (p. 13)".

The research conducted by Spitz extended the Kohler-Wallach (1944) cortical satiation theory into the realm of mental retardation theory. Cortical satiation in the retardate was investigated through comparative studies of CA matched retarded and nonretarded samples in a variety of perceptual situations -- such as, figural after-effects and Necker cube reversals. The main tenet of the resulting theory is that all retardates suffer from inadequate neural or cortical functioning as manifested in a slowness to satiate to stimuli and a less-than-normal modifiability in cortical cell functioning.

Spitz (1963, pp. 29-30) presented four postulates based upon his experimental findings which help to clarify the cortical satiation position in retardation theory.

> Postulate 1. In retardates, it takes longer to induce temporary, as well as permanent, electrical, chemical, and physical changes in stimulated cortical cells.
>
> Postulate 11. Once stimuli induce temporary chemical and electrical modification of cortical cells, it takes longer for these cells to return to their previous state.
>
> Postulate 111. In retardates, once stimuli induce permanent chemical, electrical, and/or physical changes in cortical cells, it will be more difficult and take a longer period of time to switch consequent like- or relatively similar - stimuli away from these particular cell traces or current patterns so as to form new, or different, traces or patterns.
>
> Postulate 1V. In retardates, there is less spread of electrochemical activity from stimulated cells into the surrounding cortical field.

The cortical satiation theory, when applied to the learning process in retardates, offers an explanation to account for the slowness of retardates to reach a learning set as well as the longer time required to induce a reversal once the set has been learned. The theory also accounts for the noted phenomenon that retardates are often unable to make use of what they have learned in situations which are not directly related to the original learning situation.

Zigler (1967a, 1967b) recognized the possibility that inadequate or defective cortical satiation might legitimately explain the retarded functioning of organically impaired individuals. His criticism centered upon the fact that Spitz did not account for etiological differences in the retardate population nor did he match the samples in terms of MA.

The general psychometric definition of retardation employed by Spitz (all persons under 70 IQ) is not compatible with Zigler's two-group approach which envisages organic and familial retardation as distinct entities. Spitz described the differences which he found between the CA matched retarded sample (undifferentiated as to etiology) and the nonretarded sample as indicative of a physiological difference rather than a difference in developmental level. Spitz further predicted that the defect in cortical satiation which had been identified in matched CA comparisons would be manifested in the performance of retardates matched on MA with nonretarded subjects. Zigler (1969) regarded the prediction as unwarranted.

Attentional Deficit -- D. Zeaman and B.J. House

The basic conclusion drawn by Zeaman and House in their studies of mental retardation is that "the reasons for a learning deficit do not seem to lie in the area of instrumental learning, but rather in that of attention (1963, p. 159)". This theoretical stance was based upon studies of the discrimination learning process in retardates.

In a number of visual discrimination learning tasks the performance of groups of retarded subjects (varying in MA) was compared with that of nonretarded subjects. Examination of the slopes of backward learning curves of the retarded groups revealed that the final portions of the curves were not "distinguishably different" from those of the nonretarded groups. This prompted the conclusion that "learning rate is not a particularly important source of variance in discrimination learning of retardates (p. 217)".

The theory which evolved from the experimentation in discrimination learning purports that the learning process in retardates involves the acquisition of two responses: (1) attending to the relevant stimulus dimension and (2) approaching the correct cue of that dimension. Zeaman and House concluded that "the difficulty that retardates have in discrimination learning is related to limitations in the first, or attention, phase of this dual process rather than the second (1963, p. 220)".

Zigler (1967b) described the Zeaman and House research (House & Zeaman, 1958, 1960; Zeaman & House, 1963) as having relevance to the training of retarded children. The discovery that retarded children exhibit the same rate of discrimination learning as nonretarded children, once learning begins, is not incompatible with Zigler's developmental approach to retardation. Zigler concluded that it is only by implication that the Zeaman and House orientation to retardation might be labelled a defect or difference position.

If all retardates are implicated as having an inherent attentional deficit, the theory would then, according to Zigler, be a defect theory. Zigler (1969) noted that classification of the Zeaman and House position is, at best, speculative.

> I have purposely remained ambiguous as to whether or not the Zeaman and House attention deficit formulation is a difference or defect position. Indeed in my analysis (Zigler, 1967a) of the Zeaman and House work, I even questioned whether it was at all relevant to the developmental versus difference argument (p. 548).

According to Zigler, the behavioral differences between retarded children and nonretarded children demonstrated in the Zeaman and House studies might be as well explained in terms of a motivational or situational variable as in terms of an inherent defect in the attention-directing-mechanism. The very low IQ of many of the subjects in the Zeaman and House studies, as well as the disregard of etiological factors, makes it difficult to interpret the findings in terms of Zigler's two-group approach to mental retardation.

The conflicting orientations which have emerged from mental retardation research present a somewhat enigmatic situation concerning that segment of the retardate population which Zigler and others have designated as representative of familial retardation.

The present study examined Zigler's two-group approach to mental retardation as well as his "developmental" model of cognitive growth (Fig. 2) which generates the expectation that MA matched familial retardates and nonretarded persons should demonstrate no appreciable differences in cognitive functioning irrespective of IQ differences. Tasks related to Witkin's cognitive style dimension were selected as a means of investigating Zigler's theoretical position. Reasons for the selection of Witkin's cognitive style construct are presented in the rationale of the study.

Before presenting the rationale, Witkin's research will be reviewed tracing the development of the field-dependence construct which on its own merit is of interest *vis-à-vis* retarded children.

CHAPTER II

EVOLUTION OF WITKIN'S COGNITIVE STYLE CONSTRUCT

Since H.A. Witkin's rudimentary beginnings in the area of individual perception, a multiplicity of variables having possible relevance to individual differences in perceptual and cognitive functioning have been investigated.

Witkin's early research (1948, 1949a, 1949b, 1949c, 1950a, 1950b, 1952) was primarily in the area of perception. With Asch (Witkin & Asch, 1948a, 1948b; Asch & Witkin, 1948a, 1948b) a series of experiments were conducted to investigate individual abilities to perceive the upright and to orient the body in space. An interesting finding from the studies of spatial orientation (Witkin & Asch, 1948b) was that individuals tended to distort their perception of the upright to a much greater degree when judgment took place within a displaced or tilted visual field. On comparison with their earlier research (1948a) in which a visual field had been absent, it seemed apparent that the effect of a distorted visual field upon the perception of the upright was to cause distortion and misjudgment.

From these first studies in spatial orientation came evidence for the existence of individual differences in perception. Such evidence prompted Witkin to explore the nature and importance of perceptual differences with regard to various perceptual tasks. Witkin (1949c) focused attention upon visual perception and attempted to demonstrate how a visual field is capable of exerting force upon a perceptual figure so as to alter an individual's perception of it. To test this notion Witkin developed a number of experimental tasks in which it might be demonstrated that even in a fairly well structured perceptual situation everyone does not perceive in the same manner.

PERCEPTUAL MEASURES

Rod and Frame Test

The rod and frame test (RFT), one of the original perceptual measures used by Witkin, requires that the subject be seated in a completely darkened room facing a luminous rod within a luminous frame. Rod and frame may be tilted independently to the right or left. After the frame has been tilted to a position at variance with the true vertical, the subject is asked to adjust the rod until he considers it to be upright. The subject's ability to adjust the rod to an upright position from the discrepant angle is used as an index of perceptual behavior. Scoring is in terms of the number of degrees of error between the perceived and true vertical.

Tilting Room - Tilting Chair Tests

Whereas the RFT was devised to investigate a subject's perception of an item within its field content, the tilting room - tilting chair tests (TRTC) were formulated to measure the subject's ability to perceive his own body as well as the entire surrounding field in relation to the upright. Witkin (1954) described the apparatus used in these tests as consisting of a box-like room

70 x 71 x 69 inches, suspended on ball-bearing pivots so that it might be tilted any number of degrees to the right or left. Inside the room is a chair which can be independently tilted in a similar fashion. Two tests were developed for use with this apparatus.

The body adjustment test (BAT) requires that the subject, seated in the chair which is tilted from the upright, adjust his body to a position which he considers to be upright. During this time the room is at a discrepant angle.

The second test, the room adjustment test (RAT), is very similar to the BAT, the major difference being that the subject remains in an initial tilted position during each trial and is required to instruct the examiner in adjusting the room to bring it to a position perceived as upright. Both the BAT and RAT are scored in terms of perceptual error (measured in degrees) from the true vertical.

Embedded-Figures Test

Having extensively studied individual differences in the manner of perceiving the upright, Witkin (1950b) began to search for other perceptual tasks which would reveal the manner in which individuals perceive figures within larger field contexts. In an attempt to extend the kinds of perceptual areas studied, a task was sought which would not involve perception of the upright or the adjustment of body position.

A review of Gottschaldt's (1926) work in perception led Witkin to decide that an embedded figures task similar to the one which he had developed would serve as a third perceptual index. The new test was designed by selecting eight simple figures and twenty-four complex figures from the Gottschaldt originals. To increase the difficulty of Gottschaldt's black and white outline figures, colored patterns were introduced and superimposed upon them. Twenty-four figures, graded as to difficulty, were incorporated into the embedded-figures test (EFT). Figure 3 presents specimen items from the test.

FIELD-DEPENDENCE -- FIELD-INDEPENDENCE

Witkin (1948b, 1949b, 1949c) found a wide spectrum of abilities in RFT performance ranging from those able to adjust the rod to a perfect upright position to those who tilted the rod far toward the angle of the tilt of the frame. As an explanation for these differences Witkin postulated that the perceptual behavior demonstrated by each individual is indicative of his ability to overcome the influence of the surrounding field; that is, to separate an item from its context. The differential dependence upon field cues presented a continuum of perceptual behaviors.

Results from the BAT and RAT suggested the same continuum having at one extremity those unable to perceive an item indepen[illegible]ly of its field and, at the other extremity, those capable of dealing with a perceptual situation in an analytical fashion regardless of the field context. The first mode of perception was labelled field dependence (FD); the second, field independence (FI).

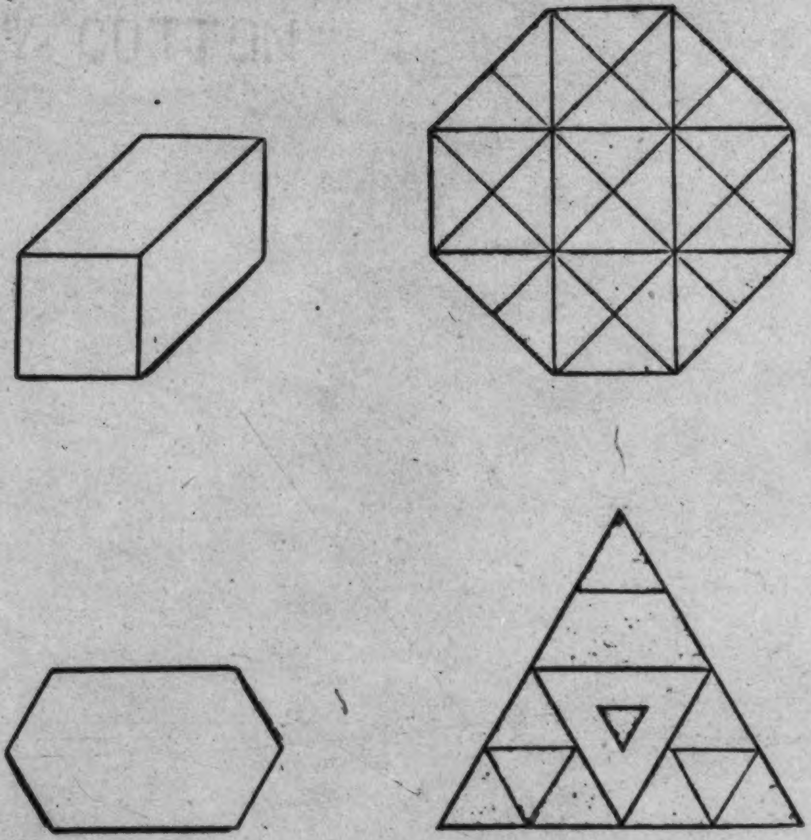

Fig. 3. Specimens from the Embedded-Figures Test (Witkin, 1959, p. 55)

Witkin defined the two modes of perceptual behavior in the following manner:

> The mode of perceiving which reflects ability to deal with the field in an active analytical fashion and to differentiate objects from their background has been called "field-independent analytical". The opposite way of perceiving which reflects submission to the influence of the field and the inability to keep an item separate from its surroundings, we call "field-dependent" (Witkin, 1950, p. 497).

With the discovery of the field-dependence dimension came numerous other important findings.

Generality and Stability of Perceptual Behavior

From the early research Witkin found strong indications that personal perceptual factors play an important role in perceptual experience. Witkin (1949c), using the RFT to investigate the nature and importance of individual differences in perception, began to speculate that a given mode of perception might represent a pervasive and deep-seated characteristic of the individual. To test this notion it was necessary that an individual's performance on different parts of the same test and on different tests be correlated. It was discovered that correlations for both men and women on the RFT and TRTC tests were high, allowing Witkin to conclude that the mode of an individual's orientation toward the upright is fairly consistent.

In a further study of self-consistency Witkin, Dyk, Faterson, Goodenough and Karp (1962) noted that the performance of subjects on the four perceptual tests indicated a moderate degree of consistency ($r = .40$, intercorrelation average). This finding was interpreted as meaning that an individual tends to be consistent in his mode of perception. That is, the person who follows frame cues in the RFT, adjusts his body in a similar manner in the BAT, and has difficulty with the EFT. Witkin et al. (1962) concluded that the positive correlations between perceptual test scores supported the hypothesis that the ability to resist field cues and to overcome embedding contexts is central to the field-dependence dimension.

Stability of perception was next considered in an attempt to determine whether a given mode of perception is a transient feature of a person or whether it endures over an extended period of time. The answer was provided through a study in which adult subjects were retested with the RFT and TRTC tests a year after the initial testing. The test-retest correlation between the two testing situations were: -- for men, .85 (TRTC) and .88 (RFT); for women, .86 (TRTC) and .87 (RFT). These results indicated marked stability of perceptual mode in adult populations.

With the introduction of the EFT (Witkin, 1950b), research was conducted in which 51 men and 51 women, Brooklyn College students, were administered the test. Not only did the subjects differ in total time required to complete the test (score being the sum of time taken on each item), but individual performance remained fairly self-consistent throughout the test trials. An odd-even correlation carried out on the 24 trials yielded a .87 correlation for men and a .74 correlation for women. The conclusion drawn from the research was that facility to perceive an embedded figure is a persistent characteristic of each individual and that individuals differ greatly in this regard.

Bauman (1951) tested the stability of perceptual behavior while at the same time testing the reliability of Witkin's perceptual battery. Test-retest correlations were performed upon the perceptual behavior of both men and women on the RFT, BAT, and EFT with a three year interval between testing sessions. The following correlations were obtained: RFT, r = .84 (men), .66 (women); BAT, r = .77 (men), .74 (women); EFT, r = .89 (men), .89 (women). Numerous other researchers (Linton, 1952; Longenecker, 1956; Dana & Goocher, 1959; Gardner, 1960; Loeff, 1961) have found support for Bauman's findings.

With regard to the intercorrelations of the four major perceptual measures, the RAT tends to correlate lowest with the other measures. Witkin (1954) suggested that the RAT has a rather complex basis and is, in rather fundamental ways, different from the RFT, BAT and EFT. Whereas the latter three tests require the separation of an item (rod, body or geometric design) from the field in which it is embedded, the RAT requires the subject to evaluate the position of the field itself. Witkin labelled the RFT, BAT and EFT "part-of-a-field" tasks differing from the RAT which was labelled a "field-as-a-whole" task. For these reasons the RAT was abandoned in the computation of the perceptual index in much of the subsequent research.

Sex Differences

Witkin (1949b) focused upon the possibility of sex differences in perceptual functioning. Speculating from earlier research that differences would exist, subjects of both sexes were tested in a variety of perceptual situations and, as anticipated, striking differences were noted between the performance of men and women.

In the RAT it was found that in general, women accepted the room as straight at more extreme positions of tilt than did men indicating that their perception of the upright is more likely to be influenced by the position of the prevailing field. On one series of trials where the room and chair were initially tilted to the same side, men on the average perceived the room as straight at a tilt of 11.5°, whereas the women perceived it as straight at 17.7° from the upright. In another series in which the room and chair were tilted in opposite directions, men perceived the room as straight at 22.9° from the vertical; women, at 30.3°.

The same tendency held true with the BAT in which men demonstrated an average body tilt of 8.6° when they perceived themselves as vertical. Women showed an average body tilt of 12.5° in the same situation.

In further research employing the RFT, it was found that most subjects, to a greater or lesser degree, perceived the upright as shifted toward the tilt of the frame. Again, women made greater errors in perception of the upright tending to go along with the field cues. With body erect, men tilted the rod an average of 7.4° from the vertical whereas women tilted it 11.0°. Under all conditions and variations of the RFT women tended to be more field dependent and less able to rely on experiences from their own bodies in making perceptual judgments.

Since the stimulus situation was identical for each of the sexes in all test series, Witkin speculated that the origin of the systematic differences between the performances of the groups would be found in personal characteristics of the sexes.

Witkin (1949c) conducted another series of studies investigating the nature of individual differences in perception which had been indicated in earlier research. Consistent with the 1949b study, sex differences in perception were again demonstrated with women displaying a higher degree of field-dependence than men. Witkin's conclusion was that:

> The finding of perceptual differences associated with as broad and fundamental a differentiation of people as sex supports the conclusion that the process involved is related in an essential way to the basic psychological organization of the person (1949c, p. 160).

Having firmly established that sex differences exist in the perception of the upright, Witkin (1950b) began to probe individual differences in perception of embedded figures using the EFT. The test was administered to 51 male college students and 51 female college students. The analysis of sex differences conducted on the data obtained from this study is presented in Table 1.

Besides the differences between the sexes, a striking inter-subject range of scores appeared for both the male and female samples. Self-consistency, as measured in terms of correlations between odd

TABLE 1

Distribution of Time Scores and Means and Standard Deviations for Men and Women on Embedded Figures

(Witkin, 1950b, p. 9)

Total time scores	Frequency	
	Men (N=51)	Women (N=51)
0 - 1' 59"	1	0
2' 0" - 3' 59"	1	2
4' 0" - 5' 59"	6	2
6' 0" - 7' 59"	9	7
8' 0" - 9' 59"	5	1
10' 0" - 11' 59"	2	1
12' 0" - 13' 59"	5	3
14' 0" - 15' 59"	5	2
16' 0" - 17' 59"	2	2
18' 0" - 19' 59"	3	4
20' 0" - 21' 59"	2	5
22' 0" - 23' 59"	0	2
24' 0" - 25' 59"	2	2
26' 0" - 27' 59"	2	3
28' 0" - 29' 59"	1	0
30' 0" - 31' 59"	0	2
32' 0" - 33' 59"	0	2
34' 0" - 35' 59"	0	1
36' 0" - 37' 59"	1	1
38' 0" - 39' 59"	0	2
40' 0" - 41' 59"	1	1
42' 0" - 43' 59"	0	1
44' 0" - 45' 59"	0	0
46' 0" - 47' 59"	0	2
48' 0" - 49' 59"	1	0
50' 0" - 51' 59"	0	0
52' 0" - 53' 59"	0	0
54' 0" - 55' 59"	1	2
56' 0" - 57' 59"	0	0
58' 0" - 59' 59"	1	0
⋮		
70' 0" - 71' 59"	0	1
Mean	15' 54"	23' 18"
σ	12' 48"	15' 12"

and even time scores, was found to be high for both men (.87) and women (.74). It was concluded from this study that women are generally more field dependent than are men in tasks involving embedding contexts as well as in perception of the upright.

Witkin and Wapner (1950) studied the role of visual factors in the maintenance of upright posture. In an experimental setting the structure and stability of a surrounding visual field were varied in an attempt to evaluate the effects on male and female subjects. Thirty-six men and 37 women were exposed to four visual field conditions - (1) a full visual field, provided by a fully lighted room, (2) a limited visual field, provided by a luminous cube surrounding the subject in a darkened room, (3) no visual field, provided by blind folding, and (4) an unstable visual field, provided by rocking the luminous cube clockwise and counter-clockwise around its horizontal axis in a darkened room.

It was found that both male and female Ss experienced more body sway under conditions two, three, and four. The women were more stable than the men in full-, limited-, and no-visual field conditions. On presentation of the unstable field the women were much less steady than the men. Witkin and Wapner interpreted this as meaning that women are much more dependent than men upon the visual field for their perceptual cues. The researchers concluded that:

> This greater susceptibility of women to certain kinds of changes in the visual field may be related to similar results in situations which involve the perception of the bodily position (p. 47).

Witkin, Goodenough and Karp (1959) investigated perceptual development in children and found evidence of sex differences existing as early as 8 years. Beside the consistent findings of Witkin and his fellow researchers vis-à-vis sex differences in perception, numerous other studies (Miller, 1953; Newbigging, 1954; Andreux, 1955; Wit, 1955; Bennett, 1956; Franks, 1956; Bieri, Bradburn & Calinsky, 1958; Carden, 1958) have obtained similar results from various countries, cultures, and diverse socio-economic backgrounds.

Developmental Differences

Early research with regard to spatial orientation and perception of the upright suggested that perceptual development moves through stages aligning with the general psychological development of the individual. A study by Bretnall and Witkin (1949) investigated the perceptual abilities of boys and girls at 8, 10, and 12 years of age. Figure 4 (Witkin, 1949c) illustrates the differences which were found between the groups of children and adult samples of men and women on the RFT. The graph has been interpreted as meaning (1) there is a marked tendency toward better scores (greater field-independence) as age increases, (2) there is a general tendency for girls to be more field-dependent than boys, and (3) there are marked differences between boys and girls at 8 years, a decrement between 8 and 13 years, and an increase in difference from 13 years to adulthood.

Witkin (1950) found further support for the existence of stages in perceptual development in a study examining the performance

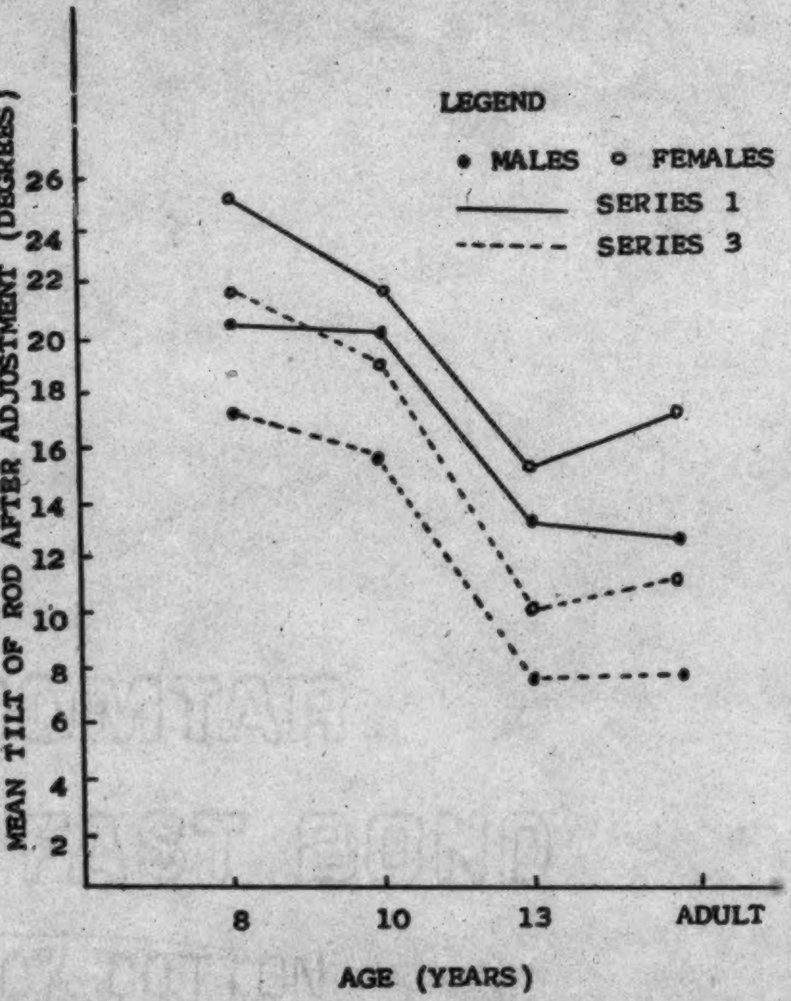

Fig. 4. Developmental curves for RFT based on cross-sectional data (Witkin, 1949c)

of children on the EFT. The children found the test extremely difficult even after permission had been granted to trace the simple figures within the complex figure contexts. Witkin interpreted the children's high time scores as a reflection of their inability to break up the complex figures, indicative that the type of analytical perception required for such tests had not yet developed.

Witkin, Lewis, Hertzman, Machover, Meissner and Wapner (1954) presented the results of a cross-sectional study in which groups of male and female subjects at different age levels (8, 10, 13, 15, 17, and adult) were administered the RFT, EFT, and TRTC tests. The mean scores for all the perceptual measures were highest at ages eight and ten. Between ten and thirteen years a larger difference in mean scores was found with regard to all perceptual indices than between any other two successive age groups. The sharp difference between these age levels was interpreted as being indicative of the decline in the influence of field cues during this stage of development. From thirteen to seventeen years field-dependence continued to decrease but at a lesser rate. After seventeen, field-dependence rose slightly as noted in the performance of both men and women.

Besides the differences identified as existing between the various age levels, the wide range of performance noted on each of the tests indicated marked individual differences in perceptual development. Tests of significance of differences in variability in each age group showed that the greatest range of variability exist at the eight and ten year levels. Nevertheless, within the adult group were found subjects who were as field-dependent as some of the children at the lowest age levels. It was concluded, and later demonstrated (Witkin et al., 1962), that relative intrapersonal stability exists with regard to each individual's psychological development. That is, any given subject tends to be more field-independent in young adulthood than in early childhood but his degree of analytical ability (relative to his peers) remains relatively stable throughout development.

This study, supporting earlier findings (Bretnall & Witkin, 1949; Witkin, 1949c, 1950b) gave further indication that perception of an item is more strongly influenced by its context at early age levels.

Witkin, Goodenough and Karp (1967) reported the results from cross-sectional and longitudinal studies indicating the same overall tendency toward greater field-independence with increasing age. The cross-sectional study included samples of children at seven age levels (8, 10, 11, 12, 13, 15, 17) as well as a sample of college students. The longitudinal study traced the perceptual development of two groups of children; one from age ten to twenty-four, the other from age eight to thirteen. Every subject in the two major studies was administered the RFT, BAT and EFT. The results from both the cross-sectional and longitudinal studies indicated increasing field-independence during development until approximately seventeen years. Figures 5, 6 and 7 illustrate the major findings of the study.

The cross-sectional data, although not the longitudinal data,

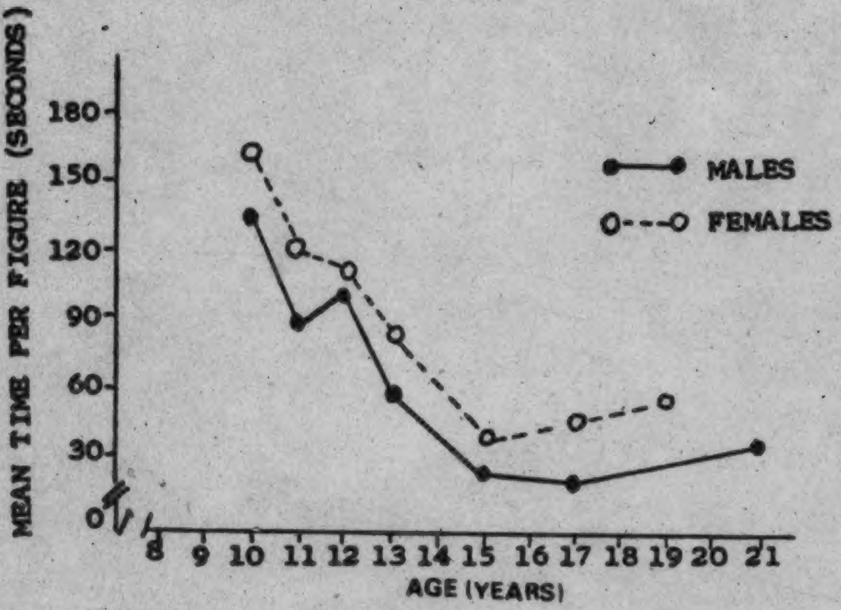

Fig. 5. Developmental curves for EFT based on cross-sectional data (Witkin, Goodenough, and Karp, 1967)

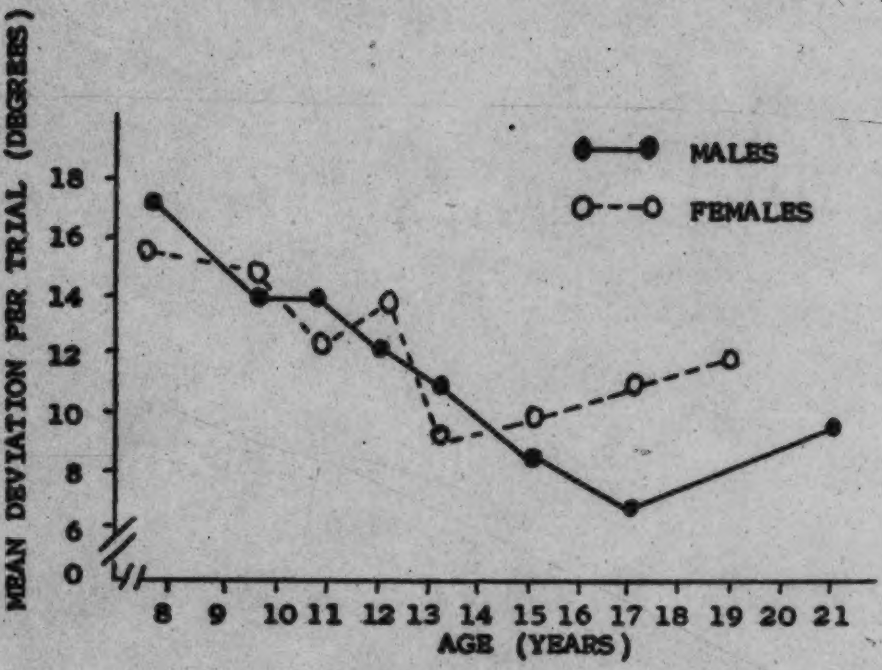

Fig. 6. Developmental curves for BAT based on cross-sectional data (Witkin, Goodenough and Karp, 1967)

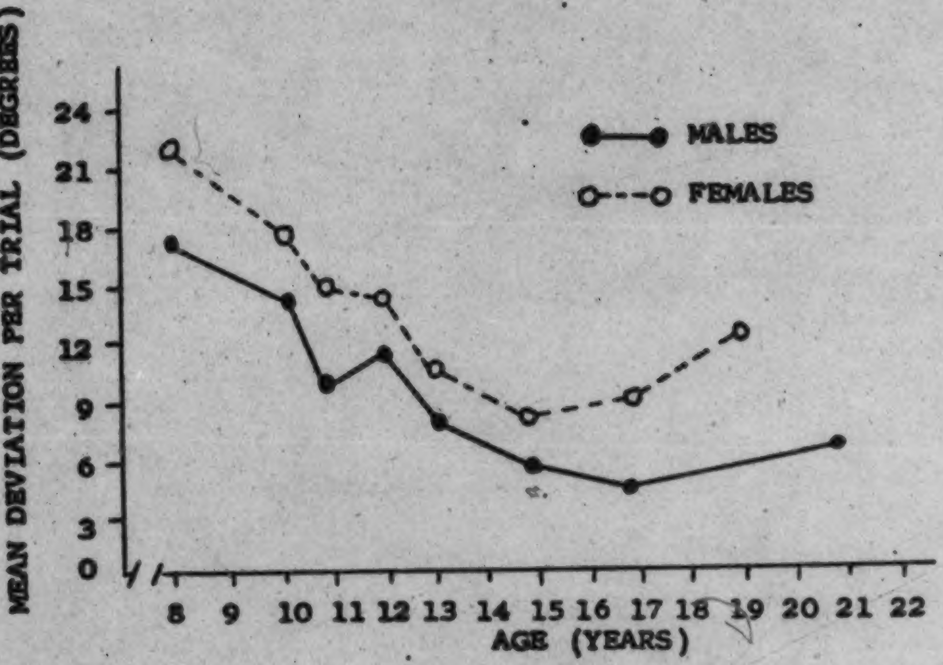

Fig. 7. Developmental curves for RFT based on cross-sectional data (Witkin, Goodenough, and Karp, 1967)

indicated that after seventeen years of age both male and female subjects retrogress to a slightly more field-dependent mode of perception. This tendency to approach a plateau in perceptual development and gradually to return to less field-independent form of perception has been demonstrated in other research studies. Schwartz and Karp (1967), as well as Comali (1965), found that geriatric groups were characterized by a strongly field-dependent type of perceptual functioning. Whether the retrogression to field-dependence begins at seventeen years is uncertain but such findings as these cited above lend credence to the view that at some point between seventeen years and old age the perceptual development process reverses.

Goodenough and Eagle (1963) using a modified form of the EFT with children as young as five years found a progressive decrease in field-dependence during the five to eight year period. Similar result was found by Karp and Konstadt (1963) using a slightly different form of the EFT with the same age group. The large volume of research concerning field-dependence and perceptual development clearly indicates that perceptual functioning follows general developmental guidelines.

FIELD APPROACH AS RELATED TO DIVERSE BEHAVIORS

Witkin's early research in perception prompted numerous investigators to consider the possible relationship between the field-dependence dimension and a variety of behaviors.

Experience of Self

Witkin et al. (1954) hypothesized that a child who has difficulty identifying a simple figure within a complex embedding background will also have difficulty perceiving his own body as separate from its surroundings. Using human figure drawings as a measure of body concept, research was carried out concerning the experience of self. A special rating scale developed by K. Machover was employed to evaluate the human figure drawings of 22 ten year old boys. Using various graphic features of the drawings as indicative of body concept level, a correlation of .41 ($p < .05$) was found between the children's figure drawing ratings and perceptual index scores. Other researchers (Fliegel, 1955; Epstein, 1957; Rosenfeld, 1958; Young, 1959) confirmed the relationship which had been identified between field approach and body concept in further tests of Witkin's 1954 hypothesis. Other studies involving a variety of measures of body concept such as the Finger Apposition Test (Epstein, 1957) and sensation of body boundaries (Silverman, Cohen & Shmavonian, 1961) have given support to the earlier research findings.

Prompted by the body concept research, studies involving a broader concept of "self" were conducted to investigate the relationship of the field-dependence dimension to the development of a "sense of separate identity" as reflected in the awareness of personal needs, feelings, and attributes as distinct from those of others. Studies considering reliance on others for guidance and support, susceptibility to the influence of external standards in judgment formation, and stability of self-view provided further understanding of the relationship between perceptual field approach and the experience of self.

Witkin *et al*. (1962) selected the Thematic Apperception Test (TAT) as an interaction situation in which children might demonstrate their degree of reliance on others and, at the same time, express attitudes concerning their own competence. TAT ratings *vis-a-vis* reliance on others (the examiner) and expressions of self-direction correlated significantly with perceptual index scores ($r = .70$, $p < .01$).

Another study reported by Witkin *et al*. (1962) tested the hypothesis that children with a global field approach limit their performance in experimental situations to those aspects specified by the instructor; that is, incidental learning is minimized. An experimental situation using the techniques of Gardner, Holzman, Klein, Linton and Spence (1950) demonstrated a significant relationship between incidental learning and perceptual field approach (.37, $p < .05$).

Gordon (1953) hypothesized that field-dependent individuals tend to view themselves as socially dependent and that others tend to see them in the same light. It was demonstrated in a research study based on this hypothesis that self-ratings of field-dependence significantly related to field-dependence in terms of the RFT, as did ratings of dependence made by others.

Linton (1952) investigated the possible relationship between the ability to use inner frames of reference in the formation and maintenance of attitudes and judgments and the field-dependence dimension. In a rather comprehensive study in which a group of college men were administered the BAT, RAT, EFT, and a number of measures of conformance to group pressure, it was found that subjects whose attitudes readily changed in the direction of conformance with the opinion of peers or an authority figure were more field-dependent than those who resisted conformance ($p < .01$).

Sanguiliano (1951), cited in Witkin et al. (1962, p. 153), used suggestibility as an index of readiness to succumb to external influences in shaping decision. In the study, three tests of suggestibility which had been used by Eysenck and Furneaux (1954) were employed. The scores on the three tests -- inkblot suggestion, odor suggestion and Binet's Progressive Weights -- correlated with the extent of field-dependence as measured by the BAT ($r = .30$, $p < .01$).

Witkin et al.(1962) on reviewing the results of the various studies involving the sense of separate identity concluded that:

> ... the use of external standards in the definition of attitudes and judgments tends to be relatively great in persons with a global field approach, permitting an inference that they have a less well-developed sense of separate identity (p. 153).

Experience of External Situations

Witkin et al. (1962) investigated the field-dependence dimension in relation to the structuring and articulation of experience. Having hypothesized that children with an analytical field approach would be better able to impose structure on unorganized stimulus material, research was conducted using the Rorschach inkblots, TAT pictures, and other vaguely defined stimulus materials.

With regard to the Rorschach materials, it was hypothesized that for highly field-dependent children the task of imposing structure on the presented materials would result in diffuse, ill-defined percepts. Ten specific aspects of test productions were selected as cues for identifying a subject's ability to structure and interpret the inkblots and were incorporated into a rating scale. Ratings were made in terms of the devised scale for a sample of thirty boys and the results were correlated with various indices of field approach. The perceptual index scores correlated .41 ($p < .05$) with the Rorschach ratings, thus confirming the hypothesis. Similar findings were made by Hemmendinger (1951) and Phillips (1957).

The results from the study led Witkin to conclude that:

> Children who are able to impose structure on the amorphous Rorschach stimulus materials and therefore experience it in a clear, definite fashion, also tend to be able to overcome an embedding context in perceptual and intellectual situations so that their experience tends to be analytical (1962, p. 93).

Another study along the same line (Witkin et al., 1962) considered the organization in Thematic Apperception Tests administered to ten year old boys. Productivity and effectiveness in organizing thoughts evoked by the TAT pictures into an orderly, rational framework were taken as indications of field-independence. Evaluations of stories were carried out in relation to four organizational categories. A correlation of .63 ($p < .01$) was obtained between organization level ratings and perceptual index scores. In a cross-validation study the relationship did not hold up and the original hypothesis was rejected. It was concluded that the ability to overcome an embedding context in a verbal medium is not the same ability as appears in the medium of stimulus configurations.

A further index of children's ability to impose structure upon experience was derived from accounts of their everyday life experiences. During interviews with children, questioning was directed toward evoking descriptions which might be rated in terms of "cognitive clarity". As hypothesized, children with higher degrees of field-independence, as identified from the perceptual tests, demonstrated better organizational ability in their accounts of experiences in the physical and social environments.

The evidence from these studies suggested that children with a highly developed analytical field approach to perceptual tasks are better prepared to organize and articulate their experiences.

Witkin et al. (1954) hypothesized that a general tendency toward "active coping" or "passive submission" in stimulus situations is a behavioral dimension closely connected to field approach. The rationale underlying the hypothesis was that the ability to extricate an item from its context represents an active dealing with the field as opposed to passive acceptance of its global organization.

Witkin and his co-researchers tested this hypothesis using children's TAT stories as an activity-passivity measure. Each subject's productions were scored in terms of assertiveness and counteraction. Although the results from this study were somewhat inconclusive, evidence from other studies (Doob, 1958; Wertheim & Mednick, 1958; Eagle, 1959) tend to support the view that people with an analytical field approach are more likely to demonstrate an active coping attitude than people with a global approach.

The Use of Defenses and Controls

Witkin *et al*. (1954) hypothesized that individuals with a high degree of field-independence are more selective and discrete in the control of impulses and in the use of defenses. It was reasoned that the field-independent individual, being better able to isolate micro aspects of stimulus situations, is more capable of prescribing articulated responses than the field-dependent individual whose response patterns are typically global.

To test the hypothesis three projective tests -- the Rorschach, the TAT, and the figure-drawing test -- were administered to twenty-three boys. It was expected that field-independent subjects would use such defenses as intellectualization and isolation as opposed to primitive denial and massive repression. A psychologist, unaware of the hypothesis, was asked to classify the children in terms of the structure of their controls and defenses. The protocols were analyzed in terms of a five point scale (1 implying least structured defenses;

5, the most structured). A comparison of defense structure ratings and perceptual index scores yielded a correlation of .61 ($p < .01$) confirming the hypothesis.

Various other studies considering such aspects of controls and defenses as the handling of aggressive impulses (Witkin et al., 1954), the use of denial (Lewis, 1954), the use of defenses as expressed in dream recall (Linton, 1952), the use of intellectualization as a defense (Crutchfield and Starkweather, 1953) supplement Witkin's findings regarding the relationship between field approach and the structure, complexity, and use of controls and defenses.

Intellectual Functioning

During the incipient stages of research in perception, Witkin and his co-workers became aware of the possibility that individual differences in perception might have cognitive counterparts. Woerner and Levine (1950) investigating the possible relationship between perceptual index scores and the Wechsler Intelligence Scale for Children (WISC), found a significant relationship suggesting that field-independence is associated with higher general intelligence. Further analysis indicated that the perceptual test scores related more highly to the WISC performance subscores than to the full scale intelligence quotient.

In view of the Woerner and Levine research, Witkin et al. (1954) began study of the relationship between perceptual and cognitive functioning in terms of the following expectation:

> It is likely - and this of course is subject to experimental test - that if a person has this basic ability to "break up" a configuration it will be manifested not only in straightforward perceptual situations, but in problem-solving situations as well (1954, p. 477).

The first study in accordance with this expectation was a replication of the Woerner and Levine investigation, this time using the 1937 Revised Stanford-Binet (Form L) with 24 ten year old subjects of each sex. The earlier research findings demonstrating a significant relationship between general intelligence and perceptual index scores were confirmed for both groups (boys, $r = .57$, $p < .01$); girls, $r = .76$, $p < .01$).

In a subsequent research study the WISC was administered to two groups of boys (30 ten year olds, 25 twelve year olds) and a group of girls (25 twelve year olds). In this study as well, the anticipated relationship between full scale IQ and perceptual index scores was confirmed for the boys (.55 and .73, $p < .01$ in each case) and, although not significant (.36), was in the expected direction for the girls. With the breakdown of full scale intelligence quotients into verbal and performance scale scores, the Woerner and Levine findings were verified with perceptual scores relating more significantly with performance than verbal scores in each of the three groups.

A factor analysis was carried out on the WISC subscores and the perceptual test scores (RFT, RAT, BAT, EFT) of each group. Three major factors were defined by the factor analysis and labelled

(1) verbal comprehension (2) attention-concentration and (3) analytical field approach.

The first factor, verbal comprehension, was defined as the typical verbal comprehension factor identified in numerous factor-analytic studies of intellectual functioning. The WISC Vocabulary, Information, Similarities, Comprehension, and Arithmetic subtests obtained the highest loadings on this factor. Factor two, best defined by the Digit Span, Arithmetic, and Coding subtests, was identified as the same attention-concentration factor as had appeared in other factorial studies involving the WISC.

The third factor, analytical field approach, identified a number of WISC subtests as having high factor loadings with the perceptual tests of field-dependence. In the factor analysis, the RFT, EFT and BAT had their highest factor loadings on this factor as did other perceptual tests such as the Children's Embedded-Figures Test (CHEF) and Thurstone's (1944) Hidden Pictures Test which had been administered to the ten year old boys in addition to the WISC. Three of the WISC subtests -- Block Design, Picture Completion and Object Assembly -- loaded heavily on this factor. All of these tasks require the ability to overcome embedding contexts to deal with component parts and call for an analytical rather than a global mode of processing.

In view of the factor loadings of the WISC subtests and the perceptual index scores, Witkin et al. (1954) concluded that field-dependence as defined in terms of perception is simply the perceptual component of a more general cognitive style.

Witkin (1962) described the expanded concept of field-dependence in the following manner:

> We have adopted the term "analytical field approach" for the style of functioning represented in both the perceptual and intellectual behavior of an individual .... The term "global field approach" has been suggested to describe the style of functioning that involves submission to the dominant organization of the field and the tendency to experience items as "fused" with their background. Field-dependence-independence represents the perceptual component of this broader dimension (p. 80).

Karp (1962) provided considerable support for the 1954 findings in a study using the BAT, RFT, EFT and six subtests from the Weschler Adult Intelligence Test (WAIS). Three factors corresponding very closely to those identified in the earlier research emerged in factor analysis. The perceptual index scores, the Block Design, and Object Assembly loaded on the same analytical factor.

Verbal skills as represented in Factor 1 of both studies (Witkin et al., 1954; Karp, 1962) did not significantly correlate with measures of field approach. Later research (Witkin et al., 1962), using a variety of measures of verbal comprehension and verbal expressiveness, supported the results from the factor analytic studies showing little, or at best, a very limited relationship between verbal skills and mode of field approach.

Guilford (1952, 1955a, 1955b, 1957) using a series of tests requiring analysis of component parts of embedding fields (Insight Problems, Match Problems, Penetration of Camouflage, The Squares

Test, Planning Air Manoeuvers, Hidden Figures) identified a factor which was labelled "adaptive flexibility".

Witkin et al. (1962) working on the hypothesis that Guilford's adaptive flexibility factor represented the same analytical field approach factor which had been identified in their research, combined measures from the two bodies of research to form a series of nine cognitive tests to be administered to 31 college men. The results from this study, presented in Table 2, yield strong support for the hypothesis with 20 of 21 correlations among adaptive flexibility measures and analytical field approach measures reaching significance.

Frederick (1969) found that the cognitive styles of sixth, eighth, and tenth grade students significantly related to their performance on concept learning and information tasks, field-independent students tending to achieve at a higher level. Other research studies (Adamson & Taylor, 1954; Fenchel, 1958; Harris, cited in Witkin et al., 1962) support the relationship between analytical problem solving ability and mode of field approach reported by Witkin et al. (1962).

Other Research Findings

Witkin, Birnbaum, Lomonaco, Lehr, and Herman (1968) investigated cognitive patterning in totally blind children. It was hypothesized that lack of vision would hamper the development of field-independence in blind children who, because of their disability, would not be able to analyze and impose structure on detailed stimulus fields. Twenty-five blind children (13 boys and 12 girls) were matched with 28

TABLE 2

Intercorrelations among Measures of Analytical Field Approach, Flexibility, and Verbal Comprehension

(Witkin, 1962, p. 74)

Test ($N = 31$)	2	3	4	5	6	7	8	9
1. BAT	.75 **	.74 **	.27	.57 *	.49 **	.53 **	.23	.32
2. RFT		.86 **	.40 *	.55 **	.67 **	.65 **	.13	.27
3. EFT			.58 **	.60 **	.72 **	.80 **	.15	.39 *
4. Insight Problems				.51 **	.59 **	.74 **	.06	.40 *
5. Match Problems					.39 *	.60 **	.06	.36 *
6. Picture Completion (WAIS)						.69 **	.22	.40 *
7. Block Design (WAIS)							.16	.34
8. Vocabulary (WAIS)								.34
9. Comprehension (WAIS)								—

* Significant at .05 level.
** Significant at .01 level.

sighted children in terms of group means for age and school grade. On a special battery of perceptual and problem solving tests the blind sample was described as inferior in analytical functioning, although equal in verbal comprehension ability and strikingly superior in the capacity for sustained auditory attention.

Fiebert (1967) conducted a research study of cognitive styles in deaf subjects. In contrast to the findings of Witkin et al. (1968) regarding blind subjects, Fiebert found that development along the field-dependence dimension in the deaf followed the usual increase in field-independence with age that characterizes "normal" development. It was also found that females in his sample tended to be more field-dependent than the males. Unfortunately, Fiebert did not include a control group in his research.

Axelrod and Cohen (1961) investigated the relationship between cognitive style in the visual mode and in the tactile mode. A positive correlation ($r = .78$) was found between performance on the visual EFT and on a tactual shape discrimination task. White (1953) found the same cross-modal consistency to exist between the visual and auditory modes.

Witkin, Faterson, Goodenough and Birnbaum (1966) investigated cognitive style in relation to a group of mildly retarded children. The findings and implications of their study will be presented later.

ORIGINS OF COGNITIVE STYLE

Seeking out the origins of cognitive style Witkin et al (1954) began investigating the possible role of diverse variables within both the immediate and macro environmental contexts. Cognizant of the potential influence of constitutional and hereditary factors on psychological development, Witkin described his orientation toward development as an "interaction approach" refuting neither nature nor nurture as a developmental influence. Nevertheless, the main focus of Witkin's work regarding the genesis of cognitive style is upon the child's interaction with his family, particularly his mother. Because of the child's extensive and complex involvement with his mother during early development, Witkin set out to investigate the mother's role in the development of the child as an autonomously functioning being.

Witkin et al. (1962) used interviews with mothers as a method to investigate mother-child interaction patterns relevant to cognitive style development. The interviews, conducted in the home, sought to determine the characteristics of the mother as a person and the nature of her interactions with her child. Witkin defined the social influence upon the child in terms of a "socialization cluster" characterized by three inter-related components: (1) the manner in which the child's attempts to be separate from others is handled, principally by the mother, (2) the regulation of the child's impulses -- i.e. is it in the direction of the child's becoming responsible or is it against the child's asserting himself and (3) the personal characteristics of the parents as related to the child's development.

In the mother interviews, 21 mothers of fourteen year old boys were questioned with regard to six specific aspects of child-rearing relating to the socialization cluster -- physical care of the child, the child's past and present adaption to school, the child's social relationships, discipline used with the child, the mother's attitude toward the child, and the relationship with other family members. The interview situation was guided by the hypothesis that characteristics of the mother as a person and the nature of her interactions with the child would be reflected in the child's cognitive style.

The format of the interview facilitated evaluation of each mother in terms of the three groups of indicators aligning with the components of the socialization cluster. See Table 3 for indicators of the socialization cluster. Guided by an analysis of each mother's child-rearing methods in terms of the indicators, each mother was classified as either fostering or inhibiting the development of a sense of separate identity and autonomous functioning in her child. Mothers who had permitted their child to separate from them,as demonstrated by their attitude, personal characteristics, and mode of handling, were designated as "IFD" mothers (interaction fostering differentiation). Conversely, mothers who had interacted with their child in such a manner as to inhibit the development of a sense of separate identity were designated "IID" mothers (interaction inhibiting differentiation).

The final ratings of the mothers as IFD or IID were compared with the perceptual index scores of their children. A significant

TABLE 3

Indicators of Socialization

(After Witkin, 1967, p. 237)

I. Separation indicators

- A. Mother's physical care not appropriate to child's age.
- B. Mother limits child's activity and movement in the community because of her fears for or ties to the child.
- C. Mother regards child as delicate, in need of special attention and/or as irresponsible.
- D. Mother doesn't accept masculine role for her son.
- E. Mother limits child's curiosity and stresses conformity.

II. Indicators of control of impulsive, assertive behaviors (mother's control inhibits child becoming responsible and is directed against child asserting himself).

- A. Administration of discipline arbitrarily and impulsively, employing irrational threats to control agression.
- B. Submissive and indulgent maternal behavior.
- C. Wavering by the mother between indulgent and coercive behavior.
- D. Mother's inability to set limits for child and help him internalize standards of behavior.

III. Indicators of personal characteristics of the parents (particularly the mother) as they affect the separation and impulse regulation processes.

- A. Mother not self assured in raising her child. Lack of self assurance hampers mother's ability to define her role as a mother, and accordingly, her ability to help her child identify himself as a separate person. It is also likely to make it difficult for the mother to set and maintain limits, thereby interfering with the child's achievement of self regulation.
- B. Mother does not have a feeling of self-realization in her own life; therefore, she is less able to allow her child to separate from her and develop as an individual in his own right.

(Ratings of children's mothers based upon these indicators have consistently correlated highly with the scores of their children upon the various perceptual measures of differentiation.)

correlation was found between the mother ratings and the development of cognitive styles in the children ($r = .85$, $p < .01$). For validation purposes two other groups of mothers were interviewed following the same procedure as had been used with the first group. Correlations for these groups were also significant (.82, $p < .01$; .65, $p < .01$) giving further support to the hypothesis. Children having IFD mothers tended to have a more highly articulated cognitive style as manifested in greater field-independence.

Upon further consideration of the factors contributing to either an IFD or IID rating, it was found that the mothers in the two groups differed greatly in terms of two specific attributes, self-assurance and self-realization. In the interview situation the IID mothers repeatedly demonstrated a lack of clarity as to how to achieve their goals and were unable to realize the needs of their children. IFD mothers, in contrast, were able to implement their goals being confident of their role as mother and aware of the needs of their children as developing individuals.

Consideration of the personal characteristics of the two types of mothers in the first phase of the research suggested two further hypotheses: (1) the degree of differentiation of the mother herself was part of the basis on which the overall global ratings of IFD and IID were determined (2) more undifferentiated children are likely to have more undifferentiated mothers.

To test these hypothesis each of the mothers from the earlier part of the study were assessed in terms of the EFT and a figure-drawing test. As anticipated, the IFD mothers drew better figures in terms of level of sophistication than did the mothers judged IID. A correlation of .20 was found between EFT scores and the earlier ratings of the mothers as IFD or IID. Although not significant, the correlation was in the expected direction. These findings, in combination, tended toward confirmation of the first hypothesis. With regard to the second hypothesis, the mother's figure-drawing scores correlated .48 ($p < .05$) with the perceptual index scores of the sons but nonsignificantly with their intellectual or cognitive index scores.

In view of the partial support for the hypotheses it was modestly concluded that mothers rated as IFD tend to be less field-dependent than mothers rated IID, and that a child's field approach tends to reflect that of his mother.

Witkin _et al_. (1962) following another approach considered parent-child relationship from the standpoint of the child. The child's view of family interaction was derived from an analysis of TAT stories produced by 38 ten year old boys. It was expected that mothers who had been rated as IFD or IID would be perceived by their children in much the same manner as they have been perceived in the home interview situation. The TAT productions were considered at face value despite the strong possibility that the portrayals might represent wish fulfilment or distortions of real life experiences. In one general category were placed stories in which the parent figures were rated as non-supportive toward the child (N); a second category classified stories in which the parent was rated supportive (S).

As anticipated, boys with a relatively global field approach portrayed their parents as essentially non-supportive. On the other hand, boys with an analytical field approach indicated a much more supportive attitude in the parental figures which they created. A significant correlation .64 ($p < .01$) was found between the children's TAT ratings of the mothers and the ratings of the mothers' interactions with the children derived from the home interviews. Congruence was thus found between accounts of the parent-child relationship as portrayed by each member of the dyad.

A study of Seder (1957), cited by Dyk and Witkin (1965), considered a number of specific hypotheses concerning mother-child interaction as related to cognitive style development. Basically, Seder hypothesized that parents of field-dependent children would be "coercive" or "infantilizing" in rearing, harsh in training with regard to aggression, would not permit independent assertive mastering of the environment, or the assumption of an adult role.

Information concerning the children in the study was obtained from the EFT; information concerning the mothers was obtained by questionnaires. Seder found that field-dependent boys had mothers who were severe in toilet training, had been punished for assertive behavior, were pushed toward parental goals rather/than defining their own goals, had been punished by moods and whims of the parents, and, had mothers who interfered on their behalf in settling disputes. Field-dependent girls came from homes characterized by less warmth and greater hostility. Essentially, Seder's findings were supportive of those of Witkin and his co-workers.

Although much information concerning the origins of cognitive style has been gained through studies such as those cited above, Witkin (1959) noted that environmental factors must not be emphasized to the exclusion of constitutional considerations.

> The characteristics of the perceiver, however, do not constitute the sole determinants of perception. It would indeed be a mistake to conclude that each of us experiences a world of his own making. Our perceptions are basically anchored to "what is there", and they are significantly dependent on the particular kinds of sensory and neural equipment we possess (p. 55).

In a number of studies reviewed by Witkin et al. (1962), attempts to change people's mode of field approach has generally proven unsuccessful. Research involving specific instructions to subjects (Witkin, 1948), drugs (Franks, 1956; Pollock, Kahn, Karp & Fink, 1960), stress situations (Davis, McCourt & Soloman, 1958; Kraidman, 1959), and alcoholic intoxication (Witkin, Karp & Goodenough, 1959) have consistently verified the stability of field approach despite changes in the psychological state of the individual.

Irrespective of the relative weights which might be assigned to various environmental and cognitive factors upon cognitive development, high stability has been shown to exist in adult cognitive style.

CHAPTER III

RESEARCH PROBLEM AND RATIONALE

Although the defect-developmental issue has become somewhat of a pedantic defense of positions (exemplified by the Zigler-Ellis exchanges), the theoretical orientations which it encompasses present a number of sophisticated, research based hypotheses concerning the familial retardate.

Chapter I presented a review of various theoretical orientations to mental retardation in terms of the dichotomy which Zigler has offered. The first position embraces a number of disparate positions (Lewin, 1936; Kounin, 1941a, 1941b; Ellis, 1963; Luria, 1963; O'Connor and Hermelin, 1963; Spitz, 1963; Zeaman & House, 1963) each of which, according to Zigler, ascribes mental retardation to some type of cognitive defect considered to be pervasive to the entire retardate population. The second position represented by Zigler (1967a, 1967b) and Jensen (1970) considers it essential that a dichotomy be made between organically-based retardation and retardation which manifests no signs of organicity.

On the basis of the two-group approach to retardation and the dichotomy which it necessitates, Zigler framed a "developmental" theory of retardation which has as its major tenet the expectation that MA matched retardates and nonretarded individuals should not differ in terms of cognitive functioning being at the same level of cognitive development. That is -- "... individuals of differing IQs who are at the same cognitive level (MA) and, therefore, at different chronological ages, should behave exactly the same on cognitive tasks (1969, p. 540)".

Zigler's model and theoretical position presented a research base-line, an investigation approach for the present study.

Justification for the assumption that MA matching represents an equation in term of cognitive functioning has been provided by Zigler in terms of his own research. Zigler has cited numerous studies (Balla & Zigler, 1964; Green & Zigler, 1962; Stevenson & Zigler, 1957; Zigler & Butterfield, 1966; Zigler & de Labry, 1962; Zigler & Unell, 1962) which investigated the equal MA, equal cognitive functioning premise in terms of concept switching, discrimination learning, transposition, satiation, learning of set, and transfer of habit. Zigler has interpreted the results from these research investigations in which no significant differences were found between familial retardates and nonretarded individuals (motivation being roughly equated) as being supportive of his theoretical position as well as his use of MA as an indicator of general level of cognitive development.

Weir (1967) strongly criticized Zigler's model pointing out that the "equal MA -- equal cognitive functioning" assumption has not been adequately tested. He asserted that many of Zigler's research studies (such as Green & Zigler, 1967) involved a minimum of learning and information processing. Weir further stated that much of the research purported by Zigler to be relevant to problem solving abilities demonstrated a marked insensitivity to differences in cognitive functioning.

In rebuttal to Weir's criticism, Zigler (1967c) emphasized that those holding the developmental position in mental retardation theory have not been reticent to test their model in terms of cognitively demanding tasks. With reference to his own research, Zigler pointed out that his model has been investigated in terms of various cognitive indices, frequently employing the same tasks used by proponents of the various defect orientations.

Although some studies comparing MA matched familial retardates and nonretarded individuals (such as Kounin, 1941a; O'Connor & Hermelin, 1963) have demonstrated the retardates to be less effective on cognitive tasks, Zigler has questioned the conclusion that such differences in performance are indicative of a physiological defect or a difference in cognitive functioning. In reference to his own research (Zigler, 1961, 1963; Zigler & de Labry, 1962; Zigler, Hodgden & Stevenson, 1958; Zigler & Unell, 1962) Zigler has presented alternative explanations for such differences in terms of non-intellective factors -- failure anticipation, negative reaction tendencies, experiential deficits, inappropriate reinforcement, and lack of self-reinforcement.

The present study compared retarded and nonretarded children in terms of their performance on measures related to Witkin's cognitive style construct employing the MA match paradigm suggested by Zigler's model. The Witkin construct was selected because it facilitated investigation of familial retardation at various levels.

At the research level, the cognitive style tasks (Rod and Frame Test & CEFT) and the Raven's Coloured Progressive Matrices were employed as separate measures of spatial ability and, in combination, as indices of a cognitive style continuum ranging from field-dependence to field-independence.

In the context of the present study, Zigler's position predicted that no significant differences should distinguish the MA matched groups. Differences would prompt a reconsideration of the various "defect" positions and encourage a consideration of cognitive style as a possible source of explanation.

In contrast to Zigler's position, other research results such as Kounin (1941a, 1941b) and O'Connor & Hermelin (1963) prompted an expectation of differences between the MA matched groups. Despite the alternative explanations suggested by Zigler to account for such results, it was the view of the writer during the incipient stages of the study that all theories offering explanation of differences between MA matched groups (in terms other than motivational) should not be summarily dismissed.

Weir (1967), as well as Jensen & Rohwer (1968), criticized Zigler's utilization of an MA matching paradigm as a means of equating nonretarded and retarded persons in terms of cognitive functioning. The basic criticism was that MA matching does not account for difference in rate of intellectual development or differences in rate of learning as reflected in IQ. This line of reasoning lent further support to the anticipation of differences between the MA matched groups.

By considering the research findings at an inferential level, it was anticipated that Witkin's (1962) proposed usage of cognitive style as a "tracer element" representative of holistic development would reveal much about differentiation in the familial retardate as compared to his nonretarded mental age counterpart. It was envisaged that questions of heuristic worth concerning appropriate methodological approaches in educating the familial retardate would present themselves.

As indicated earlier, Witkin's field-dependence construct is, on its own merit, an interesting avenue of investigation as it relates to the retarded individual. Although questions have been raised concerning Witkin's cognitive style construct and the criticism has been levied that it is task specific rather than indicative of developmental level in a holistic sense (as presented by Witkin _et al_., 1962) it does represent an ability which varies from person to person and culture to culture.

Although the present study envisaged the field-dependence dimension primarily in a perceptual and cognitive context, it seemed not unwarranted to relate the research results to Witkin's broader definition of field-dependence, if only at an inferential level -- that is, as a general developmental index. It might be worthwhile at this point to consider the expanded view of Witkin's cognitive style construct (1962) as a base-line for the inferences presented in later discussion.

The concept of field-dependence which emerged from Witkin's early research in perception has been greatly modified since its initial usage. In 1949 Witkin speculated that differences in mode of perception might be indicative of pervasive and deep-seated personality differences. As a result, subsequent research was directed toward the investigation of such a possibility.

One of the most important modifications to the concept of perceptual field approach came with the discovery of its intellectual counterpart. Factor analytic studies such as those conducted by Woerner and Levine (1950), Karp (1963), and Witkin et al. (1954, 1962) investigated perceptual field approach in relation to various intellectual skills as represented by subtests of standardized tests of intelligence. The strong relationship which was demonstrated between the analytical components of intelligence tests and the measures of field-dependence prompted the assimilation of the field-dependence construct into a larger cognitive style construct representative of both perceptual and intellectual functioning. Witkin (1964) described this important conceptual change in the following manner:

> Accordingly, we adopted the designation "analytic-global field approach" to represent this broader dimension of cognitive functioning, involving at one extreme a tendency to experience items as discrete from an organized context, and at the other extreme a tendency to experience items as fused with context (p. 180).

The discovery that perceptual development is characteristically in the direction of increased field-independence with increased age had important implications for further research. With this finding came the ranking of individual modes of perception along a developmental continuum with complete field-dependence representing the most rudimentary level of functioning. The developmental relationship between global and analytic cognitive styles prompted Witkin and his associates to suggest that children who persistently function in a cognitive style which is ontogenetically earlier than that of their peer group may have made less progress in terms of general psychological development.

Attempts to test these theoretical postulations led to extensive research studies concerning cognitive style development as related to other areas of psychological development. The guiding hypothesis for this research was described by Witkin _et al_. (1962) as the "differentiation hypothesis". The hypothesis stated that developmental indicators from different facets of development are not the products of development in "separate channels" but are "different expressions of an underlying process of development toward greater psychological complexity (p. 16)". On the basis of the differentiation hypothesis it was expected that various measures of psychological development would be significantly related for any group of children. The subsequent research studies lent support for the hypothesis demonstrating that patterns of interrelated characteristics tend to cluster around each style of cognitive functioning.

In general, the research studies indicated that the child with a relatively global cognitive style is much less complex in terms of total psychological organization than the child with relatively high field-independence. Using various projective techniques (such as the Rorschach, the TAT, and the Figure Drawing Test) it was shown that field-dependent children have a less articulated body concept, a less well defined sense of separate identity, and are less able to use specialized controls and defenses. In addition to the major studies of Witkin and his fellow investigators, other research studies (reviewed in Chapter II) have observed the same relationship between cognitive style and diverse indices of psychological development.

Consequently, in Witkin's later research, cognitive style has assumed a role which is very different from that which it had in its earlier, more finite perceptual context. Witkin et al. (1962) referred to cognitive style as a "tracer element" by which an individual's general level of psychological organization might be determined. Accordingly, cognitive style has come to represent a large constellation of interrelated perceptual, cognitive, and personal characteristics. Witkin (1967) described cognitive style in terms of its representative function:

> "Cognitive styles" are the characteristic self-consistent modes of functioning found pervasively throughout an individual's cognitive, that is, perceptual and intellectual activities. They are now known to be manifestations in the cognitive sphere, of still broader dimensions of personal functioning, evident in similar form in many areas of the individual's psychological activity. Cognitive styles thus speak on more than cognition (p. 234).

The concept of differentiation which has come to occupy a central position in Witkin's research is by no means a unique conceptual innovation. Witkin's differentiation hypothesis (1962) is related to numerous developmental theories which have as their salient characteristic the achievement of a more complex psychological organization during ontogenetic development. The concept of differentiation presented by Witkin aligns with various developmental theories which might be classified as differentiation theories; particularly, that of Heinz Werner.

Heinz Werner's theory of development is one of the few macro theories that have emerged from twentieth century research in developmental psychology. Werner, who conceived of himself as an "organismic" psychologist, fashioned a holistic theory of development to describe the entire process of ontogenesis. In Werner's basic research work, Comparative Psychology of Mental Development (1948), various areas of psychological development -- ethnogenesis, phylogenesis, pathogenesis, and ontogenesis -- were investigated within a single conceptual framework.

Central to Werner's theory of development is the concept of "differentiation". It is best explained in terms of the orthogenetic principle which Werner adopted from biology to serve as a guide-line for this theory. In essence, the principle states that "whenever development occurs it proceeds from a state of relative globality and lack of differentiation to a state of increasing differentiation, articulation, and hierarchic integration (1957, p. 126)".

According to this theory, development describes a particular type of change leading toward greater psychological complexity rather than any change equating quantitative growth. Development, as qualified in terms of Werner's differentiation theory, brings with it novel and discrete action systems which integrate in such a manner that the most advanced systems achieve control of less developed systems.

Baldwin (1968) used a model from embryology to illustrate the orthogenetic principle. In the analogy, the first cells resulting from cell division are very similar and undifferentiated as to function. Soon however, different types of cells begin to make their appearance. Only as the cells begin to transmit and receive impulses do their functions become articulated and interrelated in a network of functional reciprocating relationships. With articulation, some cells develop control over others as the organism becomes a hierarchically structured system.

Early development, as described by Werner (1948), is characterized by an initial fusion of qualities which at a later stage of development become differentiated and discrete. Bridges (1932) noted the same type of global functioning in a study of early emotional development. It was demonstrated that emotional development progresses from what is initially a rather global type of organismic excitement to a form of functioning characterized by a variety of differentiated emotional responses. The essential features of the study are presented in Figure 8.

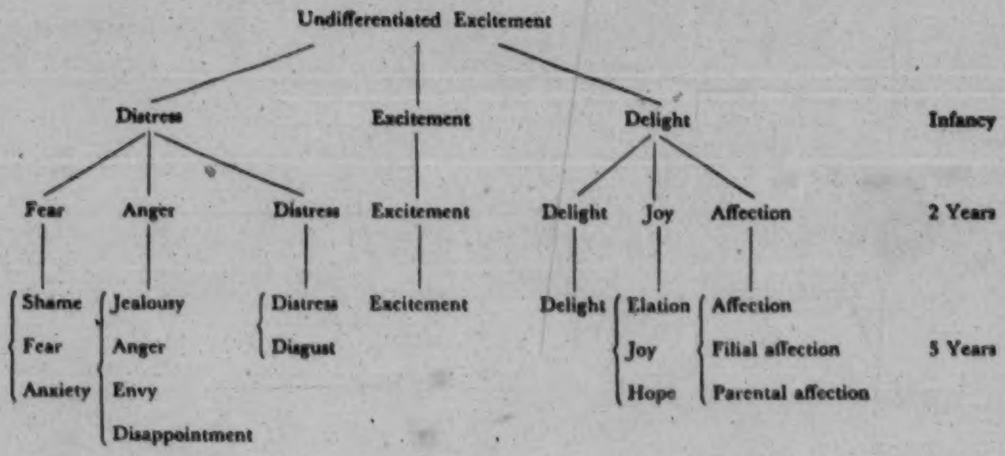
Undifferentiated Excitement
Distress
Excitement
Delight
Infancy
Fear
Anger
Distress
Excitement
Delight
Joy
Affection
2 Years
Shame
Fear
Anxiety
Jealousy
Anger
Envy
Disappointment
Distress
Disgust
Excitement
Delight
Elation
Joy
Hope
Affection
Filial affection
Parental affection
5 Years

Fig. 8. Differentiation of emotions (Bridges, 1932, p. 329)

Werner labelled this type of early fused functioning "syncretism" and found manifestations of it not only in emotional development but in diverse channels of development. Strong evidence of syncretic functioning was found in the "ego-centric" mode of perception typical of early childhood. Werner described primitive or early perceptual functioning as "physiognomic perception" in which characteristicsof the object and subject are completely fused. In contrast, "geometric-technical" perception of later development is much more dependent upon the physical properties of the perceived object and less upon the moods, needs, and aspirations of the perceiver. Werner (1948) cited the lack of differentiation between dream and reality, and the distortion of memory by affect as further examples of syncretic functioning during childhood. Although the transition from syncretic to discrete never reaches full completion, Werner regarded it as the major process underlying development. In accordance with the view that differentiation defines the entire process of development, it was concluded that syncretism pervades early development.

A key aspect of Werner's theory of development is the achievement of articulation, a process which facilitates the separateness yet relatedness between the parts of the organism. A common characteristic of undifferentiated organisms is that articulation is frequently diffuse and vague. In such organisms the tendency is toward syncretism and total organismic responses in contrast to the differentiated functioning characteristic of highly articulated behavior. Concomitant with the achievement of articulation is a noticeable increase in adaptive flexibility. That is, in the highly articulated organism a plethora of possible response patterns replace the single syncretic response typical of early global functioning.

Thus, in terms of Werner's organismic-holistic framework of development, "organisms are naturally directed toward a series of transformations -- reflecting a tendency to move from a state of relative globality and undifferentiatedness towards a state of increasing differentiation and hierarchic integration (Werner, 1957, p. 7)".

The influence of Werner's theory upon Witkin's later research is strikingly apparent. The differentiation hypothesis which has served as the major guideline for Witkin's developmental research has strong roots in Werner's theory of development. The theoretical link is clearly reflected in Witkin's definition of development.

> Although any psychological system is differentiated to some extent, it is clearly in its most undifferentiated state early in development, and becomes more differentiated as development progresses (Witkin et al., 1962, p. 11).

As previously discussed, Witkin's early research in perception evolved into an investigation of psychological differentiation with cognitive style emerging as an index of total psychological organization. Witkin's designation of cognitive style as a "tracer element" finds justification in Werner's holistic concept of development; for, as Werner and Kaplan (1967) pointed out, all changes in human behavior involve the total organism because the organism is an integrated whole. That is:

> ... with development - both in phylogenesis and in human ontogenesis - local activities become more and more integrated, that is, come more and more under the control of and determination by the local, goal-directed activities of the organism (p. 9).

A considerable number of Witkin's research findings align with Werner's theory. This is well illustrated with regard to perceptual development. Witkin's early research gave strong indication that young children perceive in a relatively global manner. As demonstrated by EFT performance, children have difficulty analyzing perceptual fields and breaking down detailed stimuli into component parts. It might be said that the details are fused in a "syncretic" mode of perception with the pervailing field being experienced as a global unit. Physiognomic perception, as described by Werner (1948), closely resembles the global field-dependent perception described by Witkin. The diffuse nature of physiognomic perception in which perceiver and perceived are inextricably united yields the same type of global functioning as the unarticulated responses of young children to embedded figures. In terms of both Werner and Witkin early perception is characteristically global.

Having once identified the pattern in perceptual development, Witkin and his fellow researchers (1954, 1962) conducted extensive research concerning cognitive, personal, and social development. Their findings along each of these dimensions of development align with Werner's holistic-organismic orientation. Witkin (1969) confirmed

Werner's theoretical stance in the following manner:

> The various psychological areas ... are linked during development making plausible the finding of an association, in the same person, of characteristics of more or less developed differentiation ... greater articulation in one area is likely to depend upon and foster the achievement of articulation in the other (p. 690).

Witkin's view of development as a holistic process of differentiation gains justification from other developmental theorists as well. There is a general consensus among various theories of personality development (despite jargonistic confusion) that there are three basic phases in "normal" development -- an autistic phase, a symbiotic phase, and a separation-individuation phase. The culmination of this developmental process is the differentiation of self and object representations. The theme of increasing differentiation pervades personality development as the child moves away from the original oneness with the mother toward the achievement of autonomous functioning.

Freud (1926) described the first few weeks of life as a state of "primary narcissism" in which there is a complete lack of awareness of the mothering agent.

> For just as the mother originally satisfied all of the needs of the foetus through her own body, so now, after its birth, she continues to do so, though partly through other means. There is much more continuity betweem intra-uterine life and earliest infancy than the impressive caesura of birth allows one to believe (p. 31).

Ribble (1941) noted that during development the young child is led from an inborn tendency to vegetate into a state of increasing sensory awareness of the environment. Spitz (1965) referred to the mother as the "auxiliary ego of the child" during the earliest period of undifferentiated functioning which closely resembles an extension of the prebirth existence.

Schachtel (1959) noted the lack of differentiation in the neonate in his description of the shift from "autocentricity" to "allocentricity" during the course of ontogenesis. He described the first phase of existence as follows:

> The infant, at first, is not capable of distinguishing between himself and whatever persons or objects of his environment come sufficiently close to him to affect him. The mother's breast is not, at first, part of "another person"; it belongs to the undifferentiated little world of the infant .... The whole concept of self and others does not make sense at this earliest period, and nothing corresponding to this concept exists for the small infant (pp. 301-302).

Winnicott (1965) and Mahler (1968) described the first phase of early existence in similar terms. It is from within the framework of the initial mother-child relationship that the child first becomes aware of the mother (at first the mother's breast) as a need-satisfying object responsible for his need satisfaction. At this point the non-existence of the child as a separate being is terminated.

By the end of the first half year of life the infant begins to express differentiated functioning in a somewhat rudimentary fashion as evidenced by varying facial expressions. An ego state which was not previously observable makes its appearance. During this time the child constantly refers back to the mother as a point of orientation in what Furer (1964) referred to as an "emotional refueling". From the secure basis of the mother-child relationship the child begins to expand beyond its immediate environment and outer-directed activity begins to replace inward-directed attention cathexis.

The transition to the world of the not-mother is well underway by the end of the first year as the child attempts physical separation from the mother. At this time the mother begins to selectively respond to the child's cues and the child comes to respond, in a rather limited fashion, to his own needs. Nevertheless, the mother must be constantly available to provide an emotional frame of reference for the child and to provide a feeling of security.

Although the child seems oblivious to the mother's presence during the onset of self-awareness, or separation, the child soon sees the need for the mother's presence as he encounters new experiences in which he finds himself unable to cope. Soon, the child returns to the supportive relationship with the mother in a type of rapprochement. The child returns to the mother but on a higher emotional level. Contact is by gestures and words rather than in terms of coddling, hugging, etc.

From this point on, the child is on his way toward separate ego functioning characterized by an existence of relatedness to his environment.

The evidence from theories of personality development relates strongly to the process of differentiation described by Witkin as the underlying trend in total organismic development. Essentially, the child evolves from a virtual non-entity to an articulated and highly complex ego structure, no longer part of an undifferentiated body-field matrix.

Witkin (1969) described the early undifferentiated state of the child as one in which " ... the child experiences himself as a more of less amorphous, continuous body-field matrix (p. 689)". Witkin's concept of development shares with the other theories which have been reviewed in that self-differentiation makes its appearance in the awareness of the needs, feelings, and attributes of self, as distinct from others; the salient feature of early development being the decline of fused mother-child functioning.

The ill effects of unpredictable, inconsistent maternal behavior described by Mahler (1968) and of infantilizing or inadequate behavior described by Bowlby (1951) strikingly resemble the findings of Seder (1957) and Witkin et al. (1962) in which mother-child interaction was found to significantly relate to the fostering or inhibiting of field-independence. The whole process of differentiated functioning, according to Winnicott (1958), is contingent upon a good mothering situation.

The concept of development as a holistic process of increasing differentiation thus finds support from major developmental sources. This support, as well as the relationship between cognitive style and various developmental indices demonstrated by Witkin et al. (1954, 1962), tends to justify the use of cognitive style as a general index of total psychological organization; that is, as a tracer element.

> Briefly we consider an articulated cognitive style to be an indicator of a high level of differentiation in the cognitive area; its development during growth proceeds in close, mutual interrelation with the development of differentiation in other areas, manifested in other identifiable indicators (Witkin, 1969, p. 688).

At the research level the study considered the Witkin measures as (1) measures of spatial ability and (2) as indicators of a cognitive style ranging from global to analytical functioning. Besides empirical use of the data, it seemed not unwarranted to anticipate consideration of cognitive style as a basis for inferential deductions with regard to the general psychological development of retarded children.

Essentially, the study entailed two interests -- (1) the cognitive functioning of MA matched retarded and nonretarded children and (2) the psychological development of the retarded individual as it relates to Witkin's field-dependence dimension.

CHAPTER IV

METHODS

The study involved two groups of subjects matched for MA on the basis of the WISC -- one group composed of familial retardates, the other composed of nonretarded children. A test battery comprised of two of Witkin's measures of cognitive style (RFT, CEFT) and the Raven's Coloured Progressive Matrices were employed to determine the relationship between the groups with regard to spatial abilities and general psychological development.

SELECTED MEASURES

Graham-Kendall Memory for Designs Test (MFD)

This test, in which the influence of age and general intelligence can be minimized, was considered ideally suited to the study as a means to detect signs of organicity when selecting the familial retardate sample. Developed by Graham and Kendall (1946), the MFD is widely used as a clinical and research tool in the diagnosis of organically based mental retardation. Early research pointed out the value of the test in identifying organic impairment and, during the interim period, it has been revised and improved as a means of detecting brain damage. Essentially, the MFD involves the presentation of simple geometric designs and the reproduction of these designs by the subject.

Ritchie and Butler (1964) commenting upon the usefulness of the test as a measure of organic impairment stated that "it has the advantage over many tests of organic impairment in having a correction for intelligence level of the subject (p. 108)." Of greater importance, they asserted, is its apparent sensitivity to diffuse brain damage.

In assessing their own experimental efforts Graham and Kendall (1960) concluded that MFD scores showed little correlation with either age or measures of intelligence and that variance due to these factors can be statistically removed.

Lyle (1968) emphasized the fact that the MFD is not simply a non-verbal memory test and justified this comment with reference to the scoring system prescribed by Graham and Kendall (1960). Lyle noted that the standard scoring system is based empirically upon specific distortions in reproductions which discriminate between brain-injured and normals. Many distortions and omissions are not scored at all and complete forgetting of a figure is not counted as an index of pathology.

Anglin, Pullen, and Games (1965) attempted to compare the usefulness of two tests in the detection of brain damage -- the Visual Motor Gestalt Test (B-G) and the Graham-Kendall Memory for Designs. The sample in their study included sixty first admissions to the Athens (Ohio) State Hospital. The results from four raters on the sample's performance vis-à-vis the B-G and the MFD were compared with hospital staff diagnosis of either "organic" or "non-organic" mental deficiency for each member of the sample. The validity coefficient of the B-G (.55) and the MFD (.67) were not significantly different but score agreement on the MFD was found to be higher than on the B-G.

It was decided that the MFD performance of possible candidates for the familial retardate sample would be analyzed in terms of difference scores, a method recommended by Graham and Kendall in evaluating the performance of children and those of low intelligence -- a difference score of seven or greater being considered indicative of brain damage.

Wechsler Intelligence Scale for Children (WISC)

The WISC requires little introduction being one of the most widely used individual tests of intelligence. The WISC was selected as the basis for matching the samples in terms of mental age. Zigler's developmental model, chosen as a vehicle to investigate familial retardation in the study, necessitated mental age matching of the samples in terms of a standardized test of intelligence such as the Stanford Binet or the Weschler Scale. Consequently, the WISC was selected.

Children's Embedded Figures Test (CEFT)

The Embedded Figures Test (EFT) has been the most widely used of the Witkin measures of cognitive style. As described in Chapter II, the test measures the extent to which perception of part of a stimulus field is influenced by the entire field context. The EFT has proven too difficult for children and as a consequence, a children's version has been developed. The first revision, the Children's Hidden Embedded Figures (CHEF) was developed by Goodenough and Eagle (1963) but it proved too unwieldly and complex to administer. A further revision (Karp and Konstadt, 1963) serves at present as a downward extention of the EFT.

As in the adult form, the CEFT is composed of a series of 25 items which require the subject to find a simple form within a complex one. Weintraub (1972), in reviewing the test, reported that the materials should prove attractive, motivating, and challenging because of the meaningful complex figures which have been selected as stimulus fields.

The concurrent validation of the CEFT with the EFT was precluded for younger children because of the difficulty level of the EFT but correlations between CEFT and EFT for 11 and 12 year old subjects (Seventh Mental Measurement Yearbook, 1972) range from .83 to .86 and, .70 for 9 and 10 year old subjects. Internal reliability scores range from .83 to .90 and compare favourably with those obtained for the EFT.

Scoring on the CEFT is in terms of correct responses, with 25 being the maximum score. Appendix A presents specimens from the CEFT.

Rod and Frame Test (RFT)

This test, developed by Witkin as a measure of field dependence has been described in detail in Chapter II. In the test situation the subject is seated in a completely darkened room facing a luminous square frame which may be tilted in a clockwise or counter-clockwise manner. Within the frame,.and pivoted at the same center, is a luminous rod which can be tilted in a similar fashion, independently of the frame. With rod and frame tilted at the outset of each trial (28° left or right), the subject is instructed to adjust the rod to a position which he perceived as vertical while the frame remains at the initial tilted position. The subject's score is the mean degrees deviation of the rod from the upright for eight trials of the test.

Because of the problem of portability, a portable version of the RFT was employed. Figure 9 presents a sketch of the portable RFT apparatus. Instructions employed with the portable RFT are presented in the Appendix B.

Raven's Coloured Progressive Matrices

The Raven's Coloured Progressive Matrices, purported by Ravens (1965) to indicate how well a person "is capable of organizing spatial perceptions into systematic related wholes (p. 127)", was used to supplement the CEFT and RFT as a further test of spatial abilities. The use of Raven's Progressive Matrices (A, Ab, B) was prompted by the work of Berry (1966) in which four tests of a spatial nature - EFT, Koh's Blocks, Morrisby Shapes, and Raven's Progressive Matrices - were administered to Eskimo, Temne and Scottish samples. Virtually all the correlations between the four tests were statistically significant and substantial for each sample.

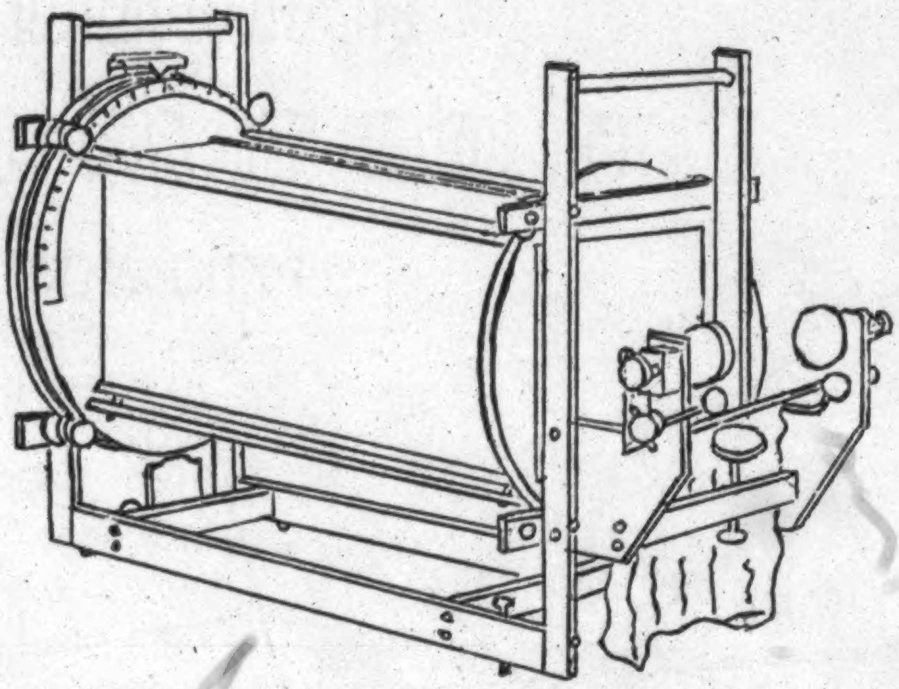

Fig. 9. Portable Rod and Frame Apparatus, Model V-1260-A (Reprinted from Operating Instructions for Vertical Rod and Frame, Portable, 1968)

The test consists of three sets of twelve problems (A, Ab, B) each requiring the subject to select the correct piece (from six possible choices) to complete a stimulus pattern. Research has demonstrated that children over six years of age, high-grade retardates, and the large majority of people suffering from physical disabilities understand the nature of the task quite readily. Scoring is in terms of the number of correct responses, with 36 being the highest possible score.

DEFINITIONS

Familial Retardate: an individual having an IQ between 50 and 70 and manifesting no signs of organicity.

Field-dependence-independence: the perceptual component of the broader cognitive style construct ranging along a global-analytical continuum.

Cognitive Style: the tendency toward an analytical or global way of experiencing which characterizes a person's problem solving activities as well as his perception.

Analytical Field Approach: a style of cognitive functioning represented in both the perceptual and intellectaul behavior of an individual which involves the ability to overcome an embedding context and to experience items as discrete from the field in which they are contained.

Global Field Approach: a style of cognitive functioning characterized by submission to the dominant organization of the field and the tendency to experience items as fused with their backgrounds.

SAMPLE SELECTION

Retardate Sample

Although much research has been conducted to consider cognitive differences between retarded children and nonretarded children, often etiological and psychometric considerations have not been adequately dealt with in the selection of retardate samples. Frequently, sample selection has been guided by a definition of retardation which includes all individuals with IQ scores less than seventy. Consequently, retardate samples have often represented amorphous groupings of institutionalized and/or non-institutionalized individuals undifferentiated as to etiology or intelligence level.

In this study a careful attempt was made to select a retardate sample which would align with the definition of familial retardation provided by Zigler's model, the research base-line of the study. It was therefore imperative that each candidate for sample inclusion fit the prescribed criteria -- (1) have an IQ in the 50 to 70 range and, (2) manifest no signs of organicity.

First criterion. Teachers at the L.Y. Cairns Vocation School in Edmonton, Alberta were asked to aid in preliminary sample selection by selecting students from their classes who met the following criteria:

1. are male
2. are in the chronological age range 12 to 16
3. have an IQ in the 50 to 70 range
4. have not been diagnosed as organically impaired --

i.e. brain damaged, P.K.U., Mongoloid

5. have not been diagnosed as emotionally disturbed
6. have no history of institutionalization
7. have no gross, uncorrected, visual, auditory or motor disabilities
8. are well motivated in terms of daily classwork

From the preliminary screening conducted in cooperation with the teachers a pool of 63 potential candidates for the familial retardate sample was created. The 63 children were administered the WISC and 15 were rejected from inclusion in the final sample because they were outside the specified IQ range or, because their MA was outside the range which had been specified for the study (7 yrs., 8 mos. to 10 yrs., 3 mos.). After having defined a population of retardates fitting the first criterion, 48 possible candidates remained.

Second criterion. Numerous studies (Goldstein, 1959; Patton and Weinstein, 1960; Sabagh & Windle, 1960; Robinson & Robinson, 1965; Kirkland, 1967) have noted that the largest segment of the institutionalized retardate population is composed of that group of retardates which have been labelled clinical, manifesting organic defects. Such findings lead one to believe that the preponderance of retardates living at home and utilizing educational facilities within the community would fit the familial retardate definition selected for the study. This, however, is somewhat speculative when applied to decisions on individual candidates for sample inclusion.

As a more certain means of insuring that members of the retardate sample fitted the second of Zigler's criteria -- manifest no signs of organicity -- each candidate was individually considered in terms of his performance on the Graham-Kendall Memory for Designs Test, a well established test for organic impairment.

As the teachers had preselected the candidates for sample inclusion in consideration of each child's medical history as presented in cumulative records, it was anticipated that few children would be lost from the tentative sample by MFD testing. Of the 48 children who were tested, ten were excluded on the basis of difference scores greater than six. Four of the 38 children who were considered suitable in terms of their MFD performance were later dropped from the sample because of violation of instructions during administration of the RFT. Table 4 presents the MFD scores of the 34 retarded children who constituted the final retardate sample.

Motivation. In consideration of the negative effects of low motivation upon retardate performance, emphatically pointed out by Zigler (1969), various techniques were employed to aid in the selection of a retardate sample which would have a reasonably high motivational level.

Zigler (1969) noted that a history of institutionalization is one of the strongest deterrants to motivation and that it "has probably contaminated more research in the field of mental retardation than any other single variable (p. 57)." Institutionalization, as viewed by Zigler, has as its concomitants preinstitutional

TABLE 4

MFD Scores of the 34 Retarded Children below the Critical Difference Score of Seven

SCORE	FREQUENCY
0	8
1	3
2	8
3	5
4	3
5	1
6	6

MEAN 2.56, S.D. 2.07

deprivation, negative reaction tendencies, and social ineffectiveness. It was therefore decided that the familial retardate sample for the study would be selected from the Edmonton Public School System, care being taken to screen out all candidates having a history of institutionalization.

In the preliminary sample selection teachers were asked to select only those children whom they considered to be highly motivated in terms of daily classwork. The underlying belief was that the use of this criterion in initial screening would help limit the number of poorly motivated members of the retardate sample.

In a further attempt to exclude from the retardate sample those individuals who at the outset lacked motivation and were disinclined to participate, a technique used by Zigler and de Labry (1962) was employed. Each candidate was individually questioned prior to testing using the following prescribed format:

> We're going to play some games today, if you want to. Do you want to? You don't have to if you don't want to. Are you sure you want to? (Zigler and de Labry, 1962, p. 269).

Although such means were not considered a guarantee of control over the motivational problem which Zigler found to be related to retardate performance, it seemed not unreasonable to expect that gross motivational differences between the samples might be appreciably decreased by their use.

Nonretarded Sample

The sample of nonretarded children was selected from second and third grade classrooms in two elementary schools of the Edmonton Public School System. Again, teachers were asked to aid in a preliminary sample selection, choosing students who met the following criteria:

1. are male
2. are in grade 2 or 3
3. have not been diagnosed as organically impaired -- i.e. brain damaged, P.K.U., Mongoloid
4. have no history of institutionalization
5. have not been diagnosed as emotionally disturbed
6. have no gross, uncorrected visual, auditory, or motor disabilities
7. are well motivated in terms of daily classwork

A group of 65 children resulting from the preliminary screening was administered the WISC. From this group 50 qualified for sample selection being within the specified mental age range. Table 5 presents descriptive data *vis-à-vis* the final MA matched samples of retarded children (n = 34) and nonretarded children (n = 34).

PROCEDURE

Having selected a retardate sample as previously described (n = 34), the next step was to match the retarded children with a group of nonretarded children so as to meet design specifications. In order to insure a close mental age match, the number of nonretarded children administered the WISC was purposely large so as to create an

TABLE 5

Means and Standard Deviations (in parentheses) of Chronological Age (CA), Mental Age (MA), IQ-Global, IQ-Verbal, and IQ-Performance, of Retarded and Nonretarded Children

GROUPS	CA	MA	IQ(GLOBAL)	IQ(VERBAL)	IQ (PERFORMANCE)
RETARDED CHILDREN	172.38 (10.60)	107.15 (8.41)	64.82 (4.65)	63.50 (6.67)	72.74 (6.44)
NONRETARDED CHILDREN	95.68 (6.36)	107.20 (8.18)	111.41 (6.08)	108.00 (8.09)	111.18 (7.89)

ample pool of qualified subjects who might be matched on a one-to-one basis with the retarded subjects.

Thirty-four nonretarded children from the pool of 50 which remained after administration of the WISC were matched with the 34 retarded children in terms of mental age. Twenty of the matched pairs were of identical mental age, 12 pairs were separated by one month, 2 pairs were separated by two months. The mental age aggregate of the retarded children was two months greater than that of the nonretarded children. The mean mental age for the retardate sample was 107 months; that of the nonretarded sample, 107 months.

After matching the groups in terms of mental age, each child included in the study was individually administered the test battery consisting of the RFT, the CEFT, and the Raven's Progressive Matrices. The order of presentation of the tests was randomized for each group. Statistical analysis (to be described in Chapter V) was carried out on the resulting data.

CHAPTER V

RESULTS

Before commencing the analysis of the performance of the retarded and nonretarded children on each of the dependent measures -- the RFT, the CEFT, and the Raven's Coloured Progressive Matrices-- raw scores were converted to T-scores so that comparisons might be made on a common matrix. Analyses presented in this chapter are based upon the standardized scores. Raw data for the retarded and nonretarded groups are presented in Appendix C.

Pearson product-moment correlations were carried out on the performance of (a) the combined group of retarded and nonretarded children ($n = 68$), (b) the retarded children ($n = 34$), and (c) the nonretarded children ($n = 34$). All correlations were plotted as a check for linearity with this being confirmed in each case.

The Raven's Coloured Progressive Matrices which was included with the RFT and CEFT from the Witkin measures correlated significantly with the RFT *vis-à-vis* the combined group ($p < .001$), the retarded group ($p < .05$), and the nonretarded group ($p < .001$). It correlated significantly with the CEFT for the combined group ($p < .001$) and the nonretarded group ($p < .05$). See Tables 6, 7, and 8.

TABLE 6

Pearson Product-Moment Correlations
on Dependent Variables for
Combined Group (N = 68)

MEASURES	r	T	P
CEFT & RFT	.44	3.93	<.001
CEFT & RAVENS	.44	3.93	<.001
RAVENS & RFT	.65	6.95	<.001

TABLE 7

Pearson Product-Moment Correlations on Dependent Variables for Retarded Children (N = 34)

MEASURES	r	T	P
CEFT & RFT	.21	1.20	NS
CEFT & RAVENS	.22	1.32	NS
RAVENS & RFT	.38	2.32	$<.05$

TABLE 8

Pearson Product-Moment Correlations on Dependent Variables for Nonretarded Children (N=34)

MEASURES	r	T	P
CEFT & RFT	.35	2.14	$<.05$
CEFT & RAVENS	.31	1.84	NS
RAVENS & RFT	.68	5.27	$<.001$

As a preliminary analysis of the research data a one-way analysis of variance was carried out on each of the dependent variables -- the RFT, the CEFT, and Raven's Coloured Progressive Matrices--thus treating the measures as independent measures of spatial ability. Significant F's ($p < .001$) were obtained for all three measures indicating that in spite of mental age matching the performance of the retarded children was inferior to that of their MA matched nonretarded counterparts.

The T score means of the two groups on each measure are presented in Table 9.

TABLE 9

T Score Means of Retarded and Nonretarded Subjects on each Dependent Variable

GROUP	RAVENS	CEFT	RFT
RETARDED	44.97	45.59	45.12
NONRETARDED	55.03	54.40	54.88

A two-way analysis of variance with repeated measures was carried out on the performance of the two groups treating the dependent variables as repeated measures. The Raven's Coloured Progressive Matrices, having been employed by Berry (1966) and others in batteries of tests related to the field-dependence construct, was treated as a repeated measure as well as the RFT and the CEFT selected from Witkin's tests of field-dependence.

A significant main effect "A" was observed between the groups. No significant main effect was observed across treatments and no interactions were identified. Table 10 summarizes the two-way analysis of variance.

TABLE 10

Summary of Two-Way Analysis of Variance

with Repeated Measures

SOURCE	DF	M.S.	F	P
BETWEEN SUBJECTS				
"A" MAIN EFFECT	1	4645.781	33.511	.0001
WITHIN SUBJECTS				
"B" MAIN EFFECT	2	.113	.003	NS*
AXB INTERACTION	2	6.973	.140	NS

*NS denotes failure to reach significance at the .05 level

Figures 10, 11, and 12 graphically illustrate the performance of the retarded and nonretarded children on each measure. The consistent differences between the MA matched groups will be considered in Chapter VI in terms of various lines of reasoning having possible merit in terms of explanation.

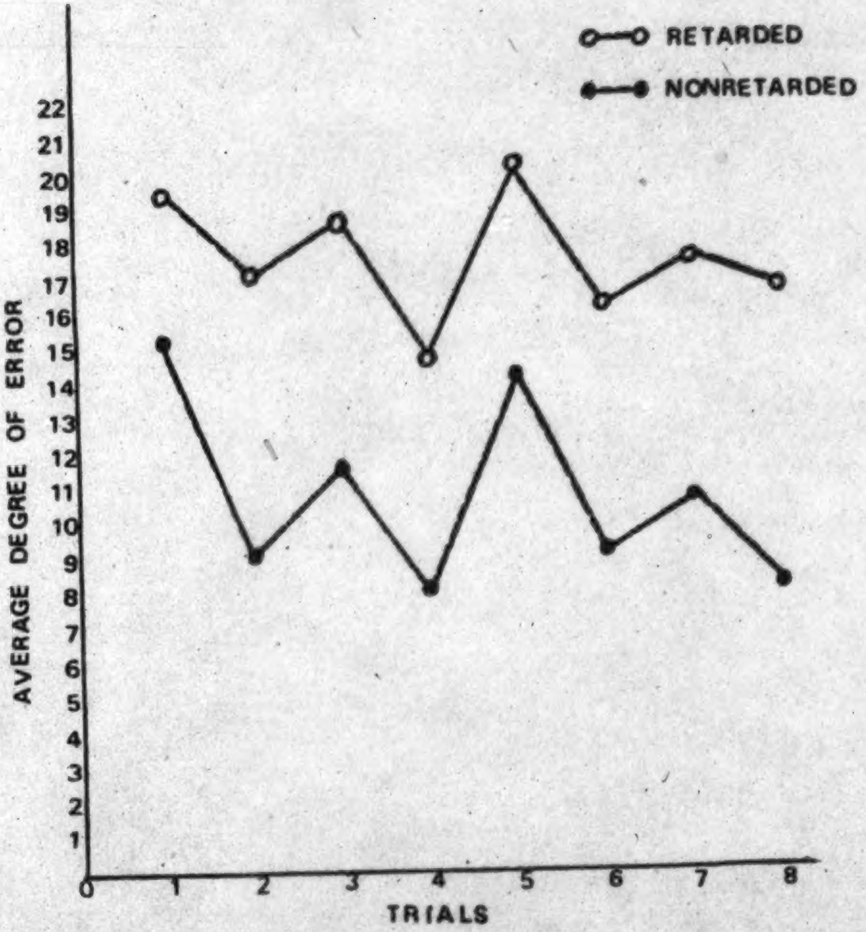

Fig. 10. Performance of retarded and nonretarded children on the RFT

DOMTAR
BELL-FAST BOND
50% COTTON

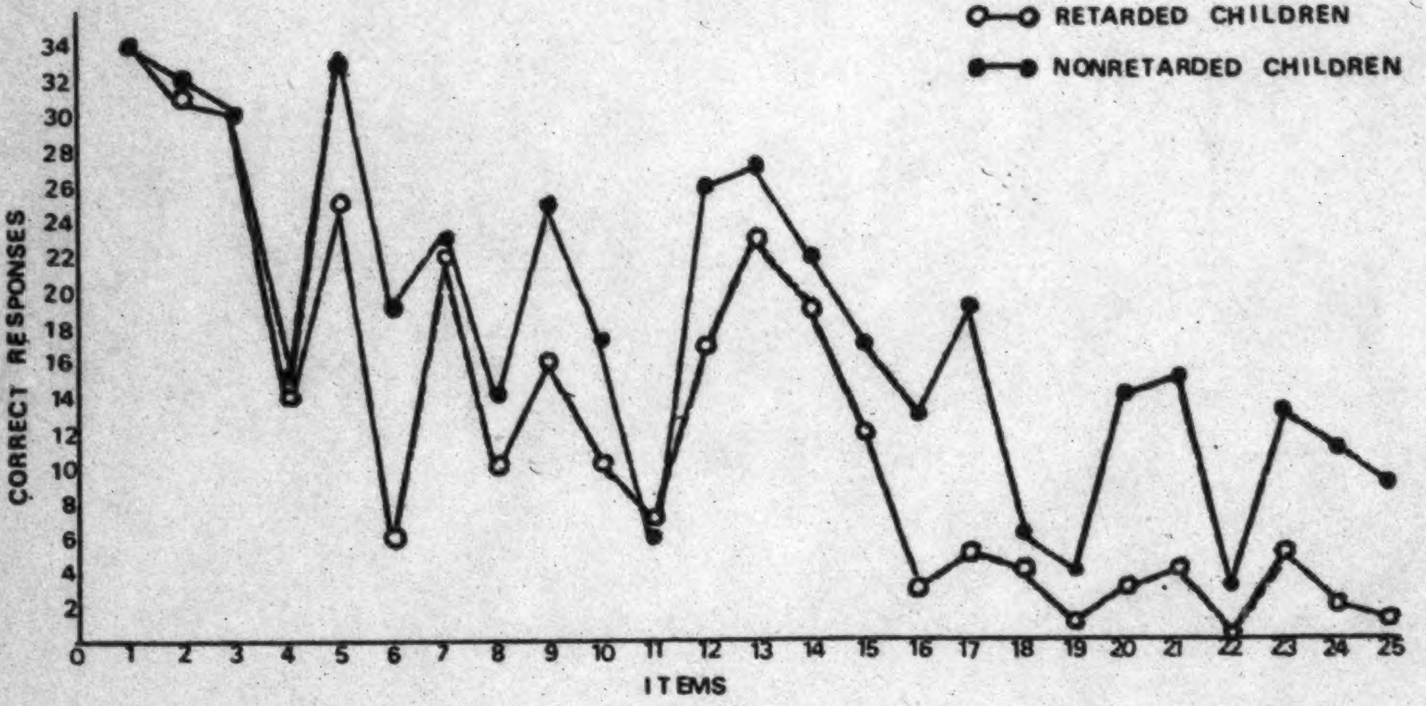

Fig. 11. Performance of retarded and nonretarded children on the CEFT

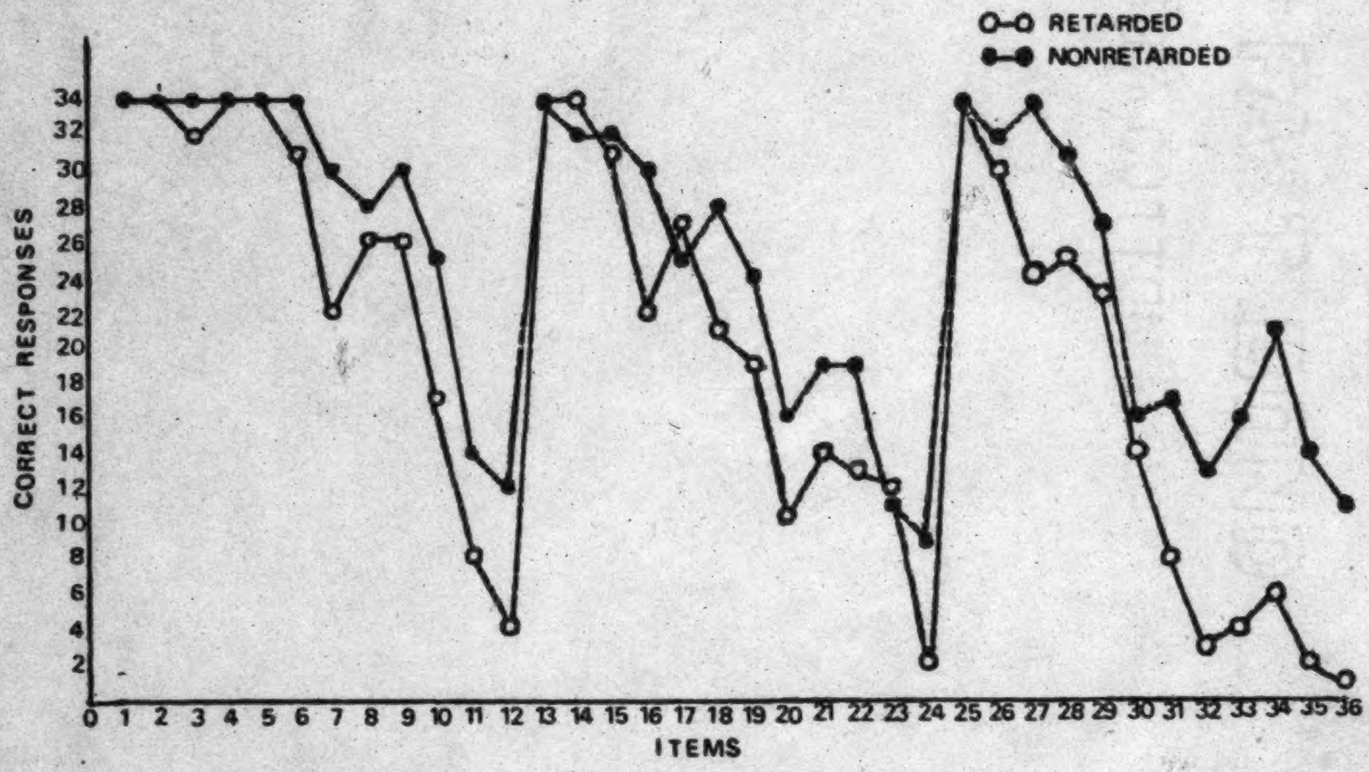

Fig. 12. Performance of retarded and nonretarded children on the Raven's Progressive Matrices

CHAPTER VI

DISCUSSION

As stated in the rationale, essentially two research interests guided this investigation -- (1) the cognitive functioning of MA matched retarded and nonretarded children and (2) the psychological development of the retarded child as it relates to Witkin's cognitive style construct.

Despite the closeness of the mental age matching in the present study, and the concerted attempt which was made to minimize gross motivational differences between the groups, the nonretarded children achieved significantly higher scores on all three measures -- the RFT, the CEFT, and Raven's Progressive Matrices -- than the retarded children. Irrespective of whether the tests are viewed as separate measures of spatial ability or as representative of a pervasive cognitive style ranging from global to analytical, the differences between the groups were marked.

Rather basic questions arise at this point: -- How do the results relate to Zigler's theoretical position and developmental model of cognitive growth which generates the expectation that no significant differences (other than motivational) should be observed when retarded and nonretarded children are matched on mental age? Do the results indicate a defect in the cognitive functioning of familial retardates? Of what explanatory value is the concept of cognitive style?

Rather than hastily drawing the conclusion that Zigler's dichotomy of the retardate population is erroneous, or that all retarded persons either overtly or covertly have some type of defect, it is imperative that Zigler's position be reconsidered with care being taken not to envisage the present study as a definitive tip of the research balance.

At the most basic level of interpretation, the study demonstrated that retarded children (classified as familial retardates) do not compare favourably on spatial ability tasks when matched on mental age with nonretarded children.

To the writer, various lines of reasoning which do not reflect unfavourably on Zigler's "two-group approach" to mental retardation have merit as possible explanations for the discrepancies observed between the groups in this study. For the most part however, these lines of explanation reflect unfavourably upon Zigler's developmental model of cognitive growth and the basic expectation which it generates.

Weir (1967) and Jensen & Rohwer (1968) represent one line of reasoning. Weir, one of the most ardent critics of Zigler's model and its inherent emphasis upon MA matching, may have relevance in providing at least partial explanation for the significant differences observed in this study. Weir's criticism does not represent a concerted attempt to discredit the concept of "familial retardation" or the possibility of a "developmental" theory of mental retardation. Essentially, it is a criticism of the MA match paradigm.

On numerous occasions Zigler has stressed the adequacy of MA matching as a means to equate retarded and nonretarded individuals in terms of cognitive functioning. He has asserted that "... it is the MA (level) and not the IQ (the relationship of MA to chronological age) that determines the exact nature, including the rate of learning on any task (1967c, p. 579)." According to this view, two persons of different CA and different IQ, but matched on MA, should demonstrate similar behavior in terms of any given cognitive task. This expectation represents the focal point of Weir's criticism.

P

Weir asserted that Zigler (1967b) defined MA as both the rate of intellectual development and the level of intellective functioning. According to Weir, the failure to distinguish between the two prompts a questioning of the "equal MA -- equal cognitive functioning" assumption. It is Weir's view that mental age is a transformation of the score made on an intelligence test and is a measure of the current level of intellective functioning, not the rate of accumulation of knowledge. The IQ score, which is a rough index of the amount of information accumulated in a given number of years, is the proper measure of rate.

Weir pointed out that the basic criticism of an MA match paradigm is that it does not take into account different rates of intellectual growth. Weir's belief is that the influences of different rates of intellectual growth should not appear only as "long term phenomena" but should also be evident in short term laboratory tasks.

In brief, Weir expressed the view that Zigler's developmental model of cognitive growth should predict differential performance for retarded and nonretarded individuals of equal MA because of the "drastically different rates" at which they are developing intellectually.

Jensen and Rohwer (1968) cited Weir and were supportive of his basic criticism of mental age matching. Extending Weir's criticism, they noted that persons of the same MA but of different IQ's should demonstrate different rates of learning, even in short term learning tasks.

Jensen (1965) compared 40 institutionalized adult retardates displaying no signs of organicity with 40 "normal" children on serial learning and paired association rote learning tasks. The groups were MA matched (MA = 9 yrs.). The school children displayed learning rates three to four times faster than the adult retardates in terms of both types of learning task.

Other studies (Jensen, 1963; Rohwer, 1967) presented essentially the same result -- the learning rate of retarded individuals compared unfavourably with that of nonretarded individuals. In view of these studies, Jensen and Rohwer (1968) concluded that "when equal - MA comparisons involve normals and familial retardates, differences in learning rates are to be expected, and, indeed, are found (p. 403)."

Relating these views to the present study it seems plausible that partial explanation for the pronounced differences between the MA matched groups might be an artifact of MA matching. If Weir's criticism of MA matching is justified (that it does not make provision for differences in rate of cognitive development), it would seem unreasonable to anticipate that retarded and nonretarded individuals, separated by as much as 80 to 100 IQ points, would perform equivalently on a cognitively demanding task such as Raven's Progressive Matrices. If one were to conclude that MA matching in itself fosters performance differences, it would seem reasonable that the MA match in Zigler's developmental model of cognitive growth might militate against the case which he has made for inclusion of the familial retardate in the "normal" polygenic distribution of intelligence.

The criticism of MA matching which has been presented by Weir (1967) and Jensen & Rohwer (1968) fosters interpretation of differences in MA matched performance in terms of differences in rate of cognitive development and rate of learning. In turn, one might reinterpret differences in rate of cognitive development as representing differences in rate of cognitive style development; and, differences in learning rate, as a reflection of underlying cognitive processing differences. It is possible that in disregarding rate factors in MA matching, one is disregarding more basic differences in cognitive processing responsible for the observed differences in rate.

Baumeister (1971) acknowledged this possibility when commenting upon the assumption that MA matching equates groups on some fundamental intellective dimension. He noted that it is conceivable that there are qualitative differences in the structures of abilities for "normals" and retardates not accounted for in MA matching. Consequently, the criticism that an MA match paradigm is insensitive to differences in rate of learning and rate of cognitive development is not considered detrimental to the explanatory value of cognitive style with regard to the research results.

Possible inherent weaknesses in MA matching notwithstanding, the research results prompt consideration of cognitive style as a source of explanation for the differences observed between the groups. The question which seems relevant at this point is: -- Would differences in cognitive style need imply some type of physiologically based defect which would separate the familial retardate from the distribution of intelligence representative of non-pathological genetic expression?

To thiswriter, the possibility that a familial retardate might employ different cognitive strategies than the "average" person (85 to 115 IQ range) seems as reasonable as the possibility that the highly gifted person might employ different cognitive strategies than the person of "average" intelligence. Such differences in cognitive functioning would not remove the familial retardate from the normal polygenic distribution of intelligence, in the same way that differences in cognitive functioning do not remove the person of "average" intelligence from the same distribution that houses the highly gifted individual.

Milgram (1969), on reviewing Zigler's stance, took issue with his case against cognitive theories of mental retardation as well as the assertion that most other theories attribute innate, if not immutable differences to all retarded individuals. Milgram did not dispute Zigler's dichotomy of the retardate population but felt that he was unjustified in dichotomizing the theories of retardation. According to Milgram, Zigler's position completely denies the possibility of cognitive differences distinguishing people of lower intelligence from those of higher intelligence. Such denial necessitates explanation of all differences between retarded and nonretarded persons of comparable mental age in terms of motivational or non-cognitive factors.

Although one would hesitate to conclude that the differences observed in the present study between the MA matched groups do not to some degree reflect the motivational factors which Zigler has noted in retardate performance, it is the view of the writer that motivational differences cannot account for the great discrepancies in performance. Considering the attempt which was made to reduce the detrimental effects of low motivation, and the interest displayed by both groups with regard to the tasks, explanation of between group differences in terms of motivational factors, does not seem viable.

Milgram (1969) discouraged the assumption that equivalence of MA scores is tantamount to equivalence in terms of cognitive functioning. According to Milgram the assumption is unjustified in that MA is a "content" variable and not a "process" variable. It is his contention that MA level tells how well an individual performed in solving sets of homogeneous items differing in level of difficulty. It does not tell which cognitive processes were utilized by the problem solver. It follows from Milgram's view that Zigler's developmental model of cognitive growth denies the possibility that individuals may utilize different cognitive processes to achieve the same end.

Viewing the measures of field-dependence employed in the present study as indices of a cognitive style ranging from global to analytical, it seems reasonable that the poor performance of the retarded children might reflect a difference in cognitive processing. That is, the retarded children in the present study displayed a higher degree of field-dependency than their MA matched counterparts.

Support for the possibility of cognitive style differences distinguishing MA matched retarded and nonretarded children is not unique to this study. Das (1972) found indication of cognitive style differences between MA matched retarded and nonretarded children on cognitive tasks of reasoning and memory. Factor analysis of the performance of each sample identified two similar factors for each group. The factors were interpreted as reflecting the simultaneous and successive cognitive processing modes suggested by Luria (1966). The retarded and nonretarded children had disparate loadings on some of the tests and this was intepreted as suggesting that the groups may have employed different cognitive processing modes in solving the problems in the tasks which were utilized.

It is interesting to speculate as to the possible relationship between Witkin's cognitive style construct and Luria's simultaneous processing mode, associated primarily with spatially presented tasks in which micro aspects of a stimulus field must be processed in concert to arrive at cogent judgement.

The results of this study indicate that the retarded child is more field-dependent than his nonretarded mental age counterpart. It appears that an analytical field-dependent cognitive style does not characterize the familial retardate's cognitive functioning.

Besides consideration of Witkin's cognitive style construct as a perceptual and cognitive phenomenon ranging from global to articulated functioning, it seems not unwarranted to inferentially consider the research results in terms of its broader definition -- that is, as a "tracer element" indicative of psychological development in a more general sense.

Witkin et al. (1954, 1962) cited numerous studies which lend credence to the existence of a strong relationship between cognitive style (as defined in terms of measures of field-dependence) and other measures of psychological differentiation. In general, the research studies indicated that a person with a relatively global cognitive style is much less complex in terms of total psychological organization than the person who displays a relatively high degree of field-independence. Accordingly, Witkin et al. (1962) concluded that development indicators from different facets of development are not the products of development in "separate channels" but are "different expressions of an underlying process of development toward greater psychological complexity (1962, p . 16)." A study by Witkin, Faterson, Goodenough, and Birnbaum (1966) identified the same type of clustering of psychological indicators in a population of retarded boys, thus extending the differentiation hypothesis to individuals of lower intelligence.

In the study by Witkin et al. (1966) retarded boys were compared with nonretarded boys on a battery of tests which included three of Witkin's measures (RFT, EFT, and BAT), the appropriate Weschler Intelligence Scale (WISC or WAIS), and a figure-drawing test designed to indicate level of sophistication-of-body-concept. The retarded boys had higher scores on the Witkin tasks and the analytical subscales of the WISC than on the verbal subscales of the WISC, but they had lower scores than the nonretarded boys on all measures.

Although a mental age match paradigm was not employed in the Witkin study, nor was the retardate sample defined as stringently in terms of IQ and organic impairment as in the present study, one conclusion is shared by the studies -- retarded children perform poorly on tasks related to the field-dependent construct.

In the 1966 study, measures of field-dependence, prorated analytical IQ's, and sophistication-of-body-concept scores were significantly related for both the retarded group and the nonretarded group. Witkin interpreted this result as further indication of the relationship between level of cognitive functioning and articulation of body concept.

Essentially, the study confirmed the findings of Witkin et al. (1954, 1962) concerning the self consistency between a person's cognitive style (global to analytical) and his level of articulation in other areas of psychological differentiation; only this time, the subjects were "teachable retardates" rather than members of the nonretarded population.

On the basis of the studies by Witkin et al. (1954, 1962, 1966), it is possible to generate inferences from the present study in which the familial retardates were less successful than the MA matched nonretarded children on all measures. Relating the results to Witkin's differentiation hypothesis, it would seem reasonable to infer that the familial retardate is less differentiated psychologically than the MA matched nonretarded child in terms of other indicators besides the RFT and CEFT. Inferences such as this necessitate extending the research results beyond that which can be empirically justified.

Accepting this limitation, one might infer from the results of the present study that the familial retardate has a less developed sense of separate identity and is more susceptible to the influence of others than is his MA matched counterpart.

This inference is by no means unsupported in literature concerning the social adjustment patterns of retarded children. Support for the inference comes from Zigler's research in which he described the familial retardate as outer-directed and responsive to external cues rather than inner frames of reference. Zigler (1966), Butterfield and Zigler (1965), and Green and Zigler (1962) noted that the retarded child (particularly from an institutionalized background) tends to seek and maintain interactions with supportive adults. Having a history characterized by failure, the retardate anticipates failure and, lacking confidence in his own abilities, tends to rely on others for solutions to problems. This outer-directedness, according to Zigler, helps explain the great suggestibility so frequently attributed to the retarded child.

Although it seems rather certain how Zigler would view Witkin's cognitive style construct (at least in the context of the present study in which cognitive differences were indicated between the MA matched groups), Zigler's description of the familial retardate is very similar to Witkin's description of the field-dependent person.

Further consideration of the research results in terms of Witkin's differentiation hypothesis prompts a number of inferences concerning the familial retardate. Granting credence to Witkin's position (that cognitive style is representative of development in a holistic sense) permits the present study to address familial retardation in terms of body concept, experience of self, and experience of the external world.

Witkin _et al_. (1962, 1966) noted the positive relationship between sophistication-of-body-concept and degree of field-dependence. From the results of this study it may be inferred that the familial retardate -- being highly field-dependent -- has a poorly defined body concept.

Bain (1972) introduced the "body-flexibility" concept to describe the extent and flexibility of one's body schema. In terms of this concept, the familial retardate would be expected to display less awareness of his body as subject and as object of experience than his MA matched nonretarded counterpart. One would anticipate that the retardate would display a fused, embedded mode of perception and would sense a minimal polarization of his body and his world. That is, in terms of body-flexibility, he would be less capable of distantiating and achieving objectivity in his experiential interactions.

Superimposing Schachtel's (1959) conceptualization of differentiation upon Witkin's differentiation hypothesis, it may be inferred from the present study that the retarded individual has made less progress than the nonretarded child in terms of the developmental shift from "autocentricity" to "allocentricity". In other words, the field-dependent retarded child tends toward the autocentric end of the hypothetical continuum.

Various theorists who share the view that ontogenetic development represents a progression from a global to a more differentiated level of psychological functioning might be considered with regard to the results of this study. Within the context of these theoretical positions the retarded child would appear less differentiated than the MA matched nonretarded child whether it be in terms of "body-flexibility" (Bain, 1972), "emotional differentiation" (Bridges, 1932), "individuation-separation" (Mahler, 1968), "autocentricity-allocentricity" (Schachtel, 1959) or "physiognomic perception" (Werner, 1948).

Granted credibility, Witkin's differentiation hypothesis would support the inference that children defined as familial retardates (as in this study) are less differentiated than MA matched nonretarded children in terms of perceptual, cognitive, personal, and social development.

What may be concluded from the study?

Factor-analytic studies of cognitive functioning have related Witkin's cognitive style construct to tasks of spatial ability (analytical subtests of the WISC, Raven's Progressive Matrices, and Koh's Blocks). In reference to the results of this study it seems justifiable to conclude that retarded and nonretarded children differ significantly on measures of spatial ability.

The research results do not support Zigler's contention that differences between MA matched retarded and nonretarded groups may be explained solely in terms of motivational factors extrinsic to cognition. Such explanations do not seem sufficient in the context of the present study in which sample selection was guided by consideration of each subject's general classroom motivational level and his willingness to participate.

Two lines of reasoning merit consideration with regard to explaining the observed differences between the MA matched groups. It does not seem unreasonable to view these positions as supplementary.

The first position offers a tentative explanation of the differences between the MA matched groups as an artifact of the research paradigm which equates for level of cognitive development but does not account for differences in learning rate or rate of cognitive development. In terms of this position, MA matching is considered to embed (if not amplify) the true nature of differences which might distinguish the cognitive processes of retarded children from those of nonretarded children.

Another line of reasoning (not antithetical to that just presented) merits credibility with regard to the research results. It is plausible that the familial retardate employs a different cognitive strategy than his MA matched counterpart when confronted with spatial tasks. In terms of the measures employed in the present study, the retarded children displayed a global or field-dependent style in contrast to the nonretarded children who appeared more analytical, or field-independent.

It is the writer's view that explanation of differences between MA matched groups in terms of cognitive style does not necessitate a criticism of Zigler's two-group approach to retardation nor does it imply a defect orientation. It seems reasonable that cognitive processes may differ along the entire polygenic distribution of intelligence. The cut-off point for mental retardation may well be an arbitrary matter. Consideration of the chess wizard who functions easily in multi-dimensional space might prompt reclassification of many who are presently considered part of the "normal" distribution of intelligence.

The writer would be reticent to conclude that the familial retardate should be excluded from the normal distribution of intelligence or to assert that all individuals defined as retarded should be viewed homogeneously. Familial retardation requires little justification as a concept. Most theorists readily accept the dichotomy between biomedical mentally defective persons and the larger group of retarded persons whose subnormality reflects a large number of genes operating in a normal non-pathological manner. Nevertheless, the study does reflect unfavourably upon Zigler's developmental model of cognitive growth and its inherent assumption that MA matching establishes an equation in terms of cognitive functioning. Marked differences were observed between the MA matched groups in this study.

The study prompts a second look at the MA matching paradigm. Possibly of more significance, it encourages further probing of the cognitive style concept as it relates to various positions along the Gaussian curve of intelligence.

In terms of education, it seems imperative that the familial retardate not be viewed solely in terms of his mental age level. Educational expectations fashioned in terms of mental age would disregard cognitive style considerations, an oversight which would militate against the retardate. In consideration of the apparent field-dependency of the retarded child, teachers would be encouraged to approach the retardate in a highly supportive role, helping to foster adequate patterns of personal and social adjustment.

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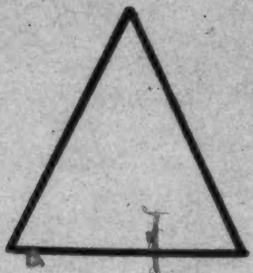
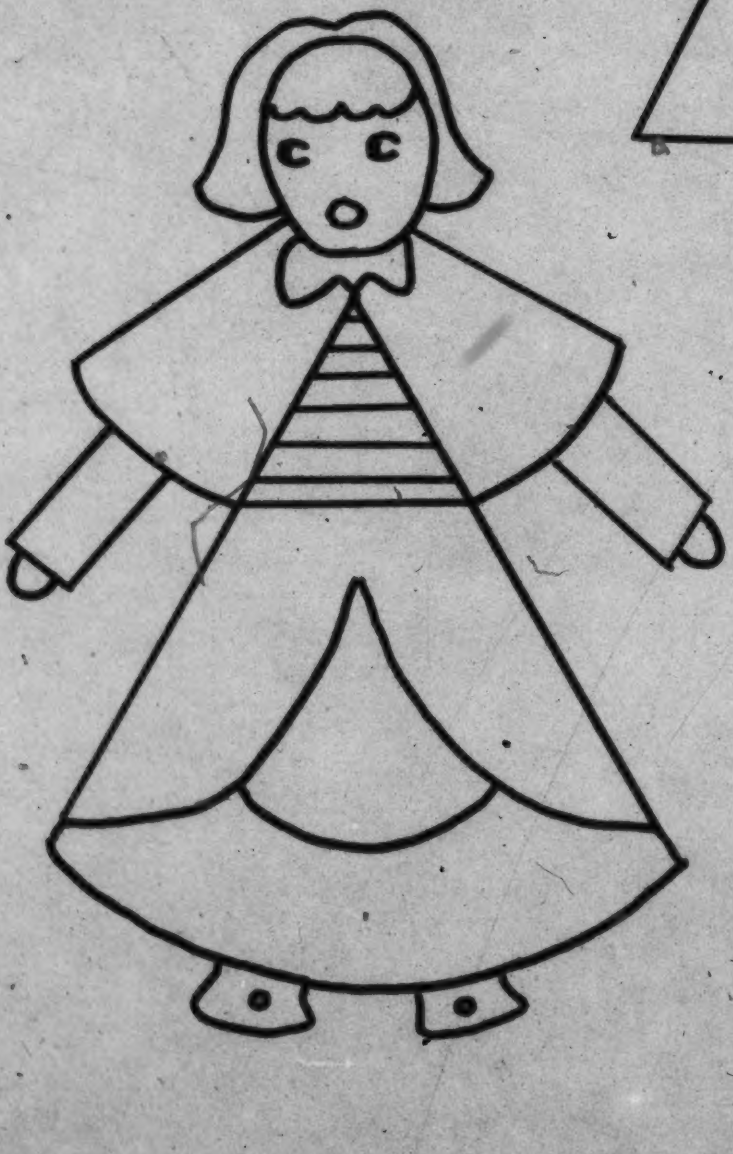
APPENDIX A

CEFT SPECIMEN -- ITEM T2





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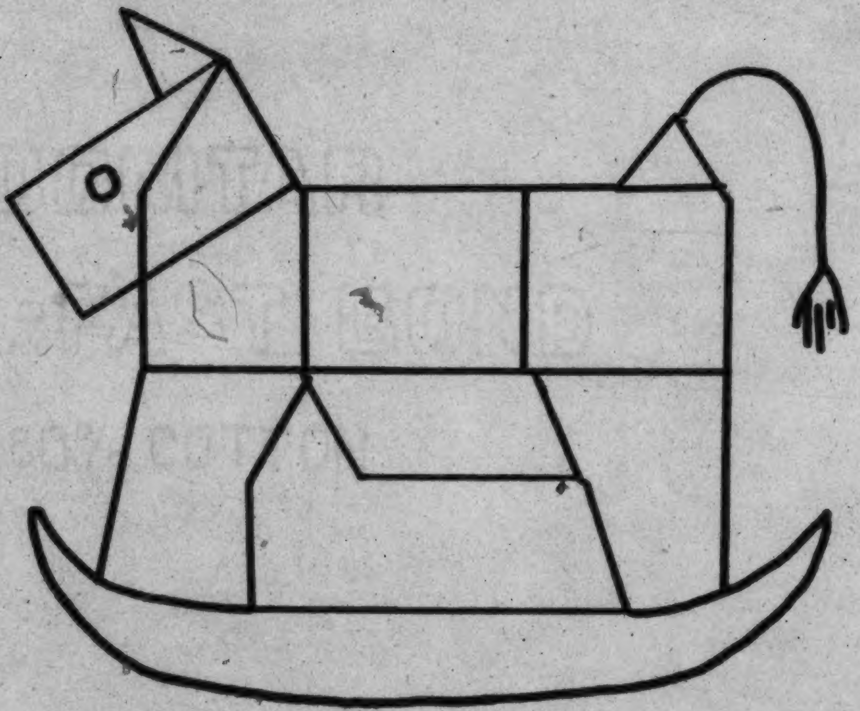

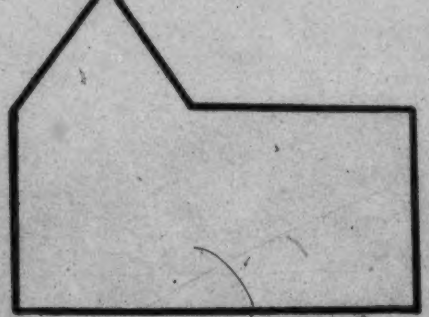

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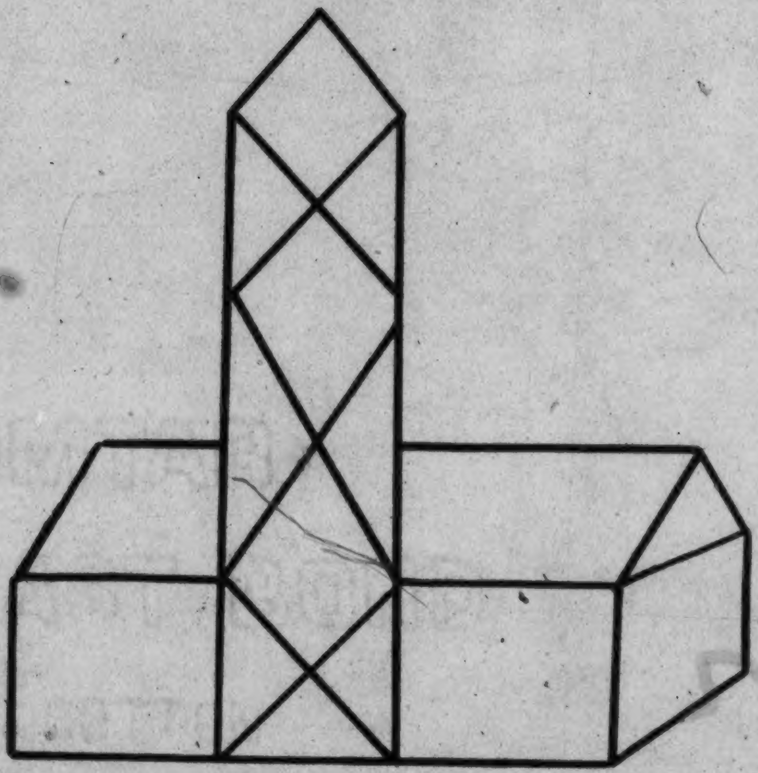

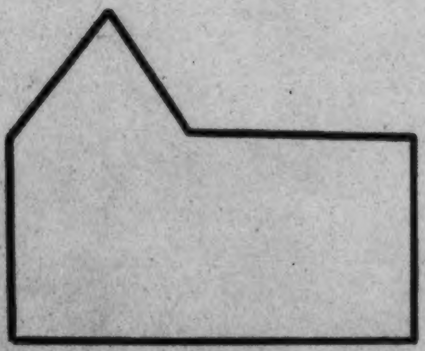

APPENDIX B

INSTRUCTIONS -- PORTABLE RFT
(RETARDED AND NONRETARDED CHILDREN)

CURTAIN CLOSED

Please sit down.

This test is kind of fun, it is to see how well you are able to tell what is straight up and down.

(a) like the walls of this room ... (pointing to the corner) see the line from the ceiling to the floor, it is straight up and down.

(b) when you are standing up on the floor of this room, like I am, you are straight up and down.

(c) telephone poles and flagpoles are straight up and down.

Put your hands on your lap. Till we're finished I want you to keep your head here (indicate position).

OPEN CURTAIN
(rod and frame not set at 0°)

Inside you see a box and a black stick. I can move the box this way and this way. I can move the black stick this way and this way.

CLOSE CURTAIN

Each time I open the curtain I want you to look at the black stick and tell me if it is straight up and down like you would be if you were standing up in this room.

OPEN CURTAIN

Trial 1. Is the black stick straight up and down with the walls of this room, like you would be if you were standing up, or is it tilted?

(If tilted) I want you to help me move it so that it is straight up and down like you would be if you were standing up in this room. After each time I move, tell me whether you want me to move it more or if it is enough. Just say "more" or "enough". I can move it as much as you like, you decide, just tell me.

OBSERVATIONS VIS-A-VIS PORTABLE RFT

With young children (CA 6 to 8 years) and retardates there are a number of problematic areas with regard to the portable RFT.

Explanation of verticality

In the instructions, "straight up and down" replaced the term "vertical" with the following illustrations used to clarify the concept:

(a) "like the walls of this room ... (pointing to the corner) see the line from the ceiling to the floor, it is straight up and down.'

(b) "when you are standing up on the floor of this room, like I am, you are straight up and down."

(c) "telephone poles and flagpoles are straight up and down."

Interpretation of the task

If both the rod and the frame are at 0° when the curtain is initially opened and the child sees the rod and frame in the position illustrated in Figure 1, the tendency is to interpret the presented situation as that which is to be achieved on subsequent trials. This was quickly noted as many of the first subjects seemed just too field dependent to be interpreting the task correctly (27° to 28° average error per trial).

However, if the child is initially presented with the rod and frame so that both rod and frame are at some degree of deviance from the vertical, as illustrated by Figure 2, they do not so readily misconstrue the task as being "to make the black stick straight up and down in the box."

It is helpful to ask at the beginning of each trial "Is the black stick straight up and down with the walls of this room, like you would be if you were standing up."

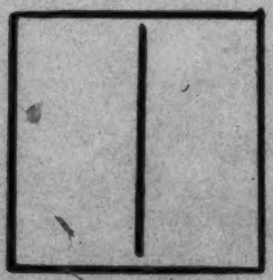

Figure 1

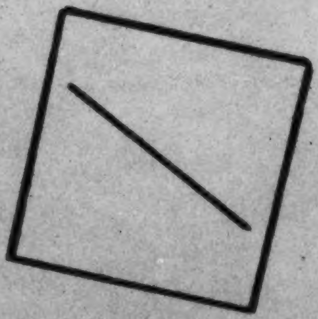

Figure 2

Administrative considerations

.It is necessary to emphatically instruct the child that he is to decide about moving the black stick and to encourage him to use his own judgment. As noted in the instructions "I can move it as much as you like, you decide, you tell me."

.Irrespective of the child's final decision, it is important not to say such things as "Is that enough?". Many children will make further adjustments (required or not) interpreting the question as meaning -- he wants me to move it more.

.Even though the child is instructed to keep his hands on his lap throughout the entire testing period, some forget and grasp the edges of the table employing the cues as a basis for judgment.

.The apparatus is fairly sensitive to shadows and it is necessary to situate it so that the light does not give preference to one side.

.Height of chair - a variety of chairs or an adjustable chair is required so that the child's head is not tilted.

A quick check on interpretation of task

On completion of trial eight, a quick check to see if the child understood the nature of the task is to let the child look into the apparatus from a distance so that he now is aware of orientation cues from the room and then ask - "Does the black stick still look straight up and down?"

Those who understood the task will indicate verbally they thought it was straight but now it doesn't look quite right.

The portable RFT as a research instrument

Both retardates and young children find the RFT an interesting test. The apparatus reduces the possibility of extraneous cues very effectively. The main problems, as outlined earlier, center upon explanation of verticality and interpretation of the task. Instructions must be modified for use with children and substitutes must be found for terms such as rod, frame, adjust, vertical, upright, counter-clockwise, and subsequent trials.

APPENDIX C

RAW DATA

	RETARDED CHILDREN			NONRETARDED CHILDREN		
Ss	RFT	CEFT	RAVEN'S	RFT	CEFT	RAVEN'S
1	93	9	19	175	10	20
2	126	10	19	116	16	19
3	178	7	18	97	9	23
4	131	5	26	191	7	17
5	192	9	19	111	10	23
6	205	18	18	81	10	31
7	157	4	24	179	8	20
8	104	7	21	174	6	19
9	116	11	23	131	16	21
10	147	11	22	116	19	25
11	180	7	20	132	14	26
12	169	3	14	76	14	22
13	147	11	20	86	19	24
14	209	11	24	74	11	22
15	60	9	29	76	6	23
16	96	12	18	102	17	24
17	197	5	16	69	4	31
18	113	9	29	93	12	33
19	195	14	23	116	8	22
20	73	16	25	49	12	27
21	198	4	21	40	14	31
22	173	8	19	48	12	32
23	80	10	15	57	15	30

RAW DATA (cont'd)

	RETARDED CHILDREN			NONRETARDED CHILDREN		
Ss	RFT	CEFT	RAVEN'S	RFT	CEFT	RAVEN'S
24	157	7	20	57	17	34
25	130	7	22	42	10	27
26	177	8	11	44	21	28
27	135	7	21	51	12	25
28	204	6	16	74	12	24
29	38	18	25	65	18	29
30	185	8	23	23	12	33
31	99	9	23	56	16	29
32	192	11	23	32	17	34
33	80	11	27	23	18	29
34	49	4	21	130	15	32

DOMTAR
BELL-FAST BOND
50% COTTON